BLM LIBRARY
88064917

PUBLIC INSPECTION COPY
PLEASE RETURN TO:
Area Oil Shale Office
U.S. Geological Survey
131 North 6th St., Suite 300
Grand Junction, CO 81501

OFFICE COPY
DO NOT REMOVE
NOV 23 1994

Rio Blanco Oil Shale Company

MODULAR DEVELOPMENT PHASE
MONITORING REPORT NINE

Volume 3 of 4

December 1980 – December 1981

Year End Report

Gulf Oil Corporation / Standard Oil Company (Indiana)
A General Partnership
2851 South Parker Road, Aurora, Colorado 80014

TN
859
.C64
R56
Dec 80-Dec 81
v.3

RIO BLANCO OIL SHALE COMPANY
MODULAR DEVELOPMENT PHASE
MONITORING REPORT 9

BLM Library
D-553A, Building 50
Denver Federal Center
P. O. Box 25047
Denver, CO 80225-0047

December 1980 - December 1981
YEAR-END REPORT

Prepared by:
RIO BLANCO OIL SHALE COMPANY
DENVER, COLORADO

April 30, 1982

APPENDICES

LIST OF APPENDICES

Volume 2

Appendix	Title
2-0	Atmospheric Studies
2-1	Air Quality Data
2-1.1	Gaseous Constituents Data - Sites 1 and 3
2-1.2	Total Suspended Particulate Data - Sites 1, 2, and 3
2-2	Meteorological Data
2-2.1	Meteorological Data - Site 1
2-2.2	Meteorological Data - Sites 2 and 3
2-2.3	Precipitation Data
2-2.4	Snow Depth Data
2-2.5	Barometric Pressure Data
2-6	Visibility Data
2-6.1	Hourly Visual Range Data - Spring 1981
2-6.2	Visibility Site Log Sheets - Spring 1981
2-6.3	Hourly Visual Range Data - Fall 1981
2-6.4	Visibility Site Log Sheets - Fall 1981
3-0	Terrestrial Studies
3-1	Vegetation Data and Analysis
3-1.1	Analyses for Browse Utilization Data
3-1.2	Phytosociological Studies Data
3-1.3	Analyses for Phytosociological Studies Data

LIST OF APPENDICES (Continued)

Volume 2 (Continued)

Appendix	Title
3-1.4	Range Productivity Data
3-1.5	Analyses for Range Production and Utilization Data
3-2	Fauna Data and Analyses
3-2.1	Small Mammal Trapping Results for 1981 by Date, Habitat, Area, Transect and Trap Number
3-2.2	Avifauna Sightings for 1981 by Date, Transect, Habitat and Area
3-2.3	Mule Deer Pellet Group Data for September 1981 and Analysis of Mule Deer Pellet Group Counts May 1978 Through September 1981
3-2.4	Mule Deer Killed by Vehicle Collision Along Rio Blanco County Road 24 During 1979, 1980 and 1981
3-2.5	Feral Horse Observations During 1978, 1979, 1980 and 1981

LIST OF APPENDICES (Continued)

Volume 3

Appendix	Title
4-0	Aquatic Studies
4-1	Abiotic Components Data
4-1.1	Water Quality Data for 1981
4-2	Biotic Components Data and Analyses
4-2.1	Species Composition of Periphyton at Each Station for all Sampling Periods in 1981
4-2.2	Seasonal Changes in Periphyton Species Composition at Each Sampling Station in 1981
4-2.3	Periphyton Enumeration Data for all Stations by Sampling Date for 1981
4-2.4	Periphyton Density and Species Diversity Calculations for all Stations by Sampling Date for 1981
4-2.5	Statistical Analysis of the 1979-1981 RBOSC Periphyton Densities
4-2.6	Taxonomic Composition of Benthic Macroinvertebrates at Each Sampling Station for all Sampling Periods in 1981
4-2.7	Seasonal Changes in Benthic Macroinvertebrate Taxonomic Composition at Each Sampling Station in 1981
4-2.8	Benthic Macroinvertebrate Enumeration Data for all Stations by Sampling Date for 1981
4-2.9	Benthic Macroinvertebrate Density and Diversity Calculations for all Stations by Sampling Date for 1981
4-2.10	Statistical Analysis of the 1979-1981 RBOSC Benthic Macroinvertebrate Densities

LIST OF APPENDICES (Continued)

Volume 3 (Continued)

Appendix	Title
5-0	Hydrology Studies
5-1	Hydrology Monitoring Data Dewatering/Reinjection/Discharge Program
5-1.1	Operations Data for the Dewatering/Reinjection System
5-1.2	Operations Water Quality Data Dewatering/Reinjection/Discharge Program
5-1.3	Springs and Seeps Data Water Quality Data
5-1.4	Upper and Lower Aquifer Field Data Dewatering/Reinjection/Discharge Program
5-1.5	Upper Aquifer Water Quality Data Dewatering/Reinjection/Discharge Program
5-1.6	Multivariate Analysis of Variance (MANOVA) Variance Tests for the Upper Aquifer Water Quality
5-2	Hydrology Monitoring Data MIS Monitoring Program
5-2.1	Operations Field Data for MIS Monitoring Program
5-2.2	Operations Water Quality Data MIS Monitoring Program
5-2.3	Springs and Seeps Data Field Data
5-2.4	Stream Station Field Data MIS Monitoring Program
5-2.5	Alluvial Aquifer Field Data MIS Monitoring Program
5-2.6	Alluvial Aquifer Water Quality Data MIS Monitoring Program

LIST OF APPENDICES (Continued)

Volume 3 (Continued)

Appendix	Title
5-2.7	Multivariate Analysis of Variance (MANOVA) Variance Test Results for Alluvial Water Quality
5-2.8	Upper Aquifer Field Data MIS Monitoring Program
5-2.9	Upper and Lower Aquifer Water Quality Data MIS Monitoring Program
5-2.10	Multivariate Analysis of Variance (MANOVA) Variance Test Results for the Upper Aquifer Water Quality MIS Monitoring Program
5-3	Hydrology Monitoring Data Lurgi Plant Site Program
5-3.1	Hydrology Field Data Lurgi Plant Site Program
5-3.2	Water Quality Data Lurgi Plant Site Program
5-3.3	Multivariate Analysis of Variancw (MANOVA) Variance Tests for the Alluvial and Upper Aquifer Lurgi Plant Site Monitoring Program

LIST OF APPENDICES

Volume 4

Appendix	Title
6-0	Special Studies/Ecological Interrelationships
6-1	Experimental Revegetation Data and Analysis
6-1.1	Plot R-1 Experimental Revegetation Data
6-1.2	Analyses for Plot R-1 Experimental Revegetation Data
6-1.3	Plot R-2 Experimental Revegetation Data
6-1.4	Analyses for Plot R-2 Experimental Revegetation Data
6-1.5	Plot R-3 Experimental Revegetation Data
6-1.6	Analyses for Plot R-3 Experimental Revegetation Data
6-4	Mule Deer Habitat Modification Study
6-4.1	Coverage and Density Data for Mule Deer Habitat Modification Studies
6-4.2	Analyses of Mule Deer Habitat Modification Study Data
6-6	Range Exclosure Data and Analysis
6-6.1	Range Exclosure Cover and Biomass Data
6-6.2	Analyses for Range Exclosure Data

APPENDIX 4-O

Aquatic Studies

APPENDIX 4-1

Abiotic Components Data

APPENDIX 4-1.1

Water Quality Data for 1981

Appendix 4-1. Water Quality Data for Station CG-1, RBOSC MDP Aquatic Monitoring Study, 1981

Parameter[1/]	April	July	October
Calcium (Ca)	81.0	82.0	76.0
Magnesium (Mg)	80.0	69.0	70.0
Sodium (Na)	160	170	170
Potassium (K)	1.27	1.36	1.34
Iron (Fe)	<0.05	<0.05	<0.05
Bicarbonate (HCO_3)	582	567	567
Carbonate (CO_3)	<1	<1	<1
Hydroxide (OH)	<0.5	<0.5	<0.5
Sulfate (SO_4)	387	359	386
Chloride (Cl)	9.52	9.70	12.0
Total Dissolved Solids (TDS)	1052	1046	1060
Total Suspended Solids (TSS)	18	37	NA [2/]
Total Alkalinity (as $CaCO_3$)	496	485	479
Total Hardness (as $CaCO_3$)	531	NA	NA
Total Phosphate (PO_4-P)	<0.01	0.01	0.07
Ammonia (NH_3-N)	0.23	0.04	<0.01
Nitrate (NO_3-N)	NA	<0.1	0.1
Fluoride (F)	3	0.35	0.71
Bromide (Br)	<0.01	NA	<2
Dissolved Organic Carbon (DOC)	0.46	3	19
Arsenic (As)	<0.0003	<0.01	<0.01
Boron (B)	<0.1	0.23	0.44
Mercury (Hg)	<0.01	<0.0003	<0.0003
Molybdenum (Mo)	<0.1	<0.1	<0.3
Selenium (Se)	<0.5	<0.01	<0.01
Silica (SiO_2)	NA	14	21
Vanadium (V)	NA	<0.5	<0.5
Aluminum (Al)	NA	NA	<0.1
Barium (Ba)	NA	NA	<0.1
Beryllium (Be)	NA	NA	<0.01
Bismuth (Bi)	NA	NA	<0.01
Cadmium (Cd)	NA	NA	<0.01
Chromium (Cr)	NA	NA	<0.01
Copper (Cu)	NA	NA	<0.01
Gallium (Ga)	NA	NA	<0.5
Germanium (Ge)	NA	NA	<0.1
Lead (Pb)	NA	NA	<0.05
Lithium (Li)	NA	NA	0.21
Manganese (Mn)	NA	NA	0.10
Nickel (Ni)	NA	NA	<0.05
Strontium (Sr)	NA	NA	1.74
Titanium (Ti)	NA	NA	<0.5
Zinc (Zn)	NA	NA	<0.01
Zirconium (Zr)	NA	NA	<10
Gross Alpha (pCi/l)	NA	NA	13
Gross Beta (pCi/l)	NA	NA	27
Cation/anion (meq/meq)	0.99	1.01	0.97

1/ Concentration of dissolved fraction in mg/l unless otherwise noted.
2/ Not analyzed.

Appendix 4-1. Water Quality Data for Station YC-1, RBOSC MDP Aquatic Monitoring Study, 1981

Parameter[1/]	April	July	October
Calcium (Ca)	140	102	83.0
Magnesium (Mg)	160	98.0	82.0
Sodium (Na)	220	230	200
Potassium (K)	1.70	2.70	2.70
Iron (Fe)	<0.05	<0.05	<0.05
Bicarbonate (HCO_3)	686	613	500
Carbonate (CO_3)	<1	1.21	<1
Hydroxide (OH)	<0.5	<0.5	<0.5
Sulfate (SO_4)	713	571	549
Chloride (Cl)	131	17.9	15.9
Total Dissolved Solids (TDS)	1728	1350	1252
Total Suspended Solids (TSS)	11	42	NA [2/]
Total Alkalinity (as $CaCO_3$)	594	542	427
Total Hardness (as $CaCO_3$)	1008	NA	NA
Total Phosphate (PO_4-P)	<0.01	0.04	0.06
Ammonia (NH_3-N)	0.09	0.03	<0.01
Nitrate (NO_3-N)	<0.01	<0.1	0.2
Fluoride (F)	0.18	0.15	0.45
Bromide (Br)	NA	NA	<2
Dissolved Organic Carbon (DOC)	8	10	9
Arsenic (As)	<0.01	<0.01	<0.01
Boron (B)	0.67	0.20	1.22
Mercury (Hg)	0.0006	<0.0003	<0.0003
Molybdenum (Mo)	<0.1	<0.1	<0.3
Selenium (Se)	<0.01	<0.01	<0.01
Silica (SiO_2)	21	12	17
Vanadium (V)	<0.5	<0.5	<0.5
Aluminum (Al)	NA	NA	<0.1
Barium (Ba)	NA	NA	<0.1
Beryllium (Be)	NA	NA	<0.01
Bismuth (Bi)	NA	NA	<0.01
Cadmium (Cd)	NA	NA	<0.01
Chromium (Cr)	NA	NA	<0.01
Copper (Cu)	NA	NA	<0.01
Gallium (Ga)	NA	NA	<0.5
Germanium (Ge)	NA	NA	<0.1
Lead (Pb)	NA	NA	<0.05
Lithium (Li)	NA	NA	0.24
Manganese (Mn)	NA	NA	<0.01
Nickel (Ni)	NA	NA	<0.05
Strontium (Sr)	NA	NA	1.77
Titanium (Ti)	NA	NA	<0.5
Zinc (Zn)	NA	NA	<0.01
Zirconium (Zr)	NA	NA	<10
Gross Alpha (pCi/l)	NA	NA	10
Gross Beta (pCi/l)	NA	NA	15
Cation/anion (meq/meq)	1.01	1.04	1.00

1/ Concentration of dissolved fraction in mg/l unless otherwise noted.
2/ Not analyzed

Appendix 4-1. Water Quality Data for Station YC-2, RBOSC MDP Aquatic Monitoring Study, 1981

Parameter[1]	April	July	October
Calcium (Ca)	63.0	47.0	51.0
Magnesium (Mg)	270	182	130
Sodium (Na)	430	443	410
Potassium (K)	3.10	2.50	7.00
Iron (Fe)	<0.05	<0.05	<0.05
Bicarbonate (HCO_3)	1027	976	754
Carbonate (CO_3)	1.21	2.40	<1
Hydroxide (OH)	<0.5	<0.5	<0.5
Sulfate (SO_4)	1195	1025	912
Chloride (Cl)	31.9	30.1	39.8
Total Dissolved Solids (TDS)	2584	2267	2084
Total Suspended Solids (TSS)	6	34	NA [2]
Total Alkalinity (as $CaCO_3$)	891	867	637
Total Hardness (as $CaCO_3$)	1268	NA	NA
Total Phosphate (PO_4-P)	0.03	0.07	0.08
Ammonia (NH_3-N)	0.26	0.03	0.11
Nitrate (NO_3-N)	<0.01	<0.1	0.2
Fluoride (F)	0.31	0.40	0.55
Bromide (Br)	NA	NA	<2
Dissolved Organic Carbon (DOC)	8	9	14
Arsenic (As)	<0.01	<0.01	<0.01
Boron (B)	0.65	0.26	0.79
Mercury (Hg)	<0.0003	<0.0003	<0.0003
Molybdenum (Mo)	<0.1	<0.1	<0.3
Selenium (Se)	<0.01	<0.01	<0.01
Silica (SiO_2)	17	5	10
Vanadium (V)	<0.5	<0.5	<0.5
Aluminum (Al)	NA	NA	<0.1
Barium (Ba)	NA	NA	<0.1
Beryllium (Be)	NA	NA	<0.01
Bismuth (Bi)	NA	NA	<0.01
Cadmium (Cd)	NA	NA	<0.01
Chromium (Cr)	NA	NA	<0.01
Copper (Cu)	NA	NA	<0.01
Gallium (Ga)	NA	NA	<0.5
Germanium (Ge)	NA	NA	<0.1
Lead (Pb)	NA	NA	<0.05
Lithium (Li)	NA	NA	0.25
Manganese (Mn)	NA	NA	<0.01
Nickel (Ni)	NA	NA	<0.05
Strontium (Sr)	NA	NA	3.41
Titanium (Ti)	NA	NA	<0.5
Zinc (Zn)	NA	NA	<0.01
Zirconium (Zr)	NA	NA	<10
Gross Alpha (pCi/l)	NA	NA	9
Gross Beta (pCi/l)	NA	NA	23
Cation/anion (meq/meq)	1.04	0.96	0.97

[1] Concentration of dissolved fraction in mg/l unless otherwise noted.
[2] Not analyzed

Appendix 4-1. Water Quality Data for Station YC-3, RBOSC MDP Aquatic Monitoring Study, 1981

Parameter[1/]	April	July	October
Calcium (Ca)	36.0	25.0	30.0
Magnesium (Mg)	140	100	110
Sodium (Na)	820	766	780
Potassium (K)	3.10	3.30	4.50
Iron (Fe)	<0.05	<0.05	<0.05
Bicarbonate (HCO_3)	1522	1490	1593
Carbonate (CO_3)	7.12	9.73	9.61
Hydroxide (OH)	<0.5	<0.5	<0.5
Sulfate (SO_4)	909	625	749
Chloride (Cl)	118	121	141
Total Dissolved Solids (TDS)	2736	2420	2605
Total Suspended Solids (TSS)	4	63	NA [2/]
Total Alkalinity (as $CaCO_3$)	1402	1419	1499
Total Hardness (as $CaCO_3$)	666	NA	NA
Total Phosphate (PO_4-P)	<0.01	0.03	0.06
Ammonia (NH_3-N)	0.11	0.03	<0.01
Nitrate (NO_3-N)	0.16	<0.1	0.2
Fluoride (F)	0.76	1.33	2.25
Bromide (Br)	NA	NA	<2
Dissolved Organic Carbon (DOC)	12	6	9
Arsenic (As)	<0.01	<0.01	<0.01
Boron (B)	0.68	0.34	0.52
Mercury (Hg)	<0.0003	<0.0003	<0.0003
Molybdenum (Mo)	<0.1	<0.1	<0.3
Selenium (Se)	<0.01	<0.01	<0.01
Silica (SiO_2)	8	5	6
Vanadium (V)	<0.5	<0.5	<0.5
Aluminum (Al)	NA	NA	<0.1
Barium (Ba)	NA	NA	<0.1
Beryllium (Be)	NA	NA	<0.01
Bismuth (Bi)	NA	NA	<0.01
Cadmium (Cd)	NA	NA	<0.01
Chromium (Cr)	NA	NA	<0.01
Copper (Cu)	NA	NA	<0.01
Gallium (Ga)	NA	NA	<0.5
Germanium (Ge)	NA	NA	<0.1
Lead (Pb)	NA	NA	<0.05
Lithium (Li)	NA	NA	0.44
Manganese (Mn)	NA	NA	<0.01
Nickel (Ni)	NA	NA	<0.05
Strontium (Sr)	NA	NA	2.60
Titanium (Ti)	NA	NA	<0.5
Zinc (Zn)	NA	NA	<<0.01
Zirconium (Zr)	NA	NA	<10
Gross Alpha (pCi/l)	NA	NA	33
Gross Beta (pCi/l)	NA	NA	91
Cation/anion (meq/meq)	1.04	1.04	0.97

1/ Concentration of dissolved fraction in mg/l unless otherwise noted.
2/ Not analyzed

Appendix 4-1. Water Quality Data for Station WR-1, RBOSC MDP Aquatic Monitoring Study, 1981

Parameter[1/]	April	July	October
Calcium (Ca)	50.0	63.0	61.0
Magnesium (Mg)	11.0	25.0	24.0
Sodium (Na)	20.0	47.0	43.0
Potassium (K)	1.12	1.55	1.63
Iron (Fe)	<0.05	<0.05	<0.05
Bicarbonate (HCO_3)	123	196	134
Carbonate (CO_3)	<1	2.41	<1
Hydroxide (OH)	<0.5	<0.5	<0.5
Sulfate (SO_4)	92.2	149	206
Chloride (Cl)	17.4	30.1	28.4
Total Dissolved Solids (TDS)	276	486	465
Total Suspended Solids (TSS)	14	58	NA[2/]
Total Alkalinity (as $CaCO_3$)	130	210	117
Total Hardness (as $CaCO_3$)	170	NA	NA
Total Phosphate (PO_4-P)	<0.01	<0.01	0.06
Ammonia (NH_3-N)	0.18	0.03	<0.01
Nitrate (NO_3-N)	<0.01	<0.1	0.1
Fluoride (F)	0.11	0.16	0.32
Bromide (Br)	NA	NA	<2
Dissolved Organic Carbon (DOC)	6	<3	16
Arsenic (As)	<0.01	<0.01	<0.01
Boron (B)	0.31	0.18	0.70
Mercury (Hg)	<0.0003	<0.0003	<0.0003
Molybdenum (Mo)	<0.1	<0.1	<0.3
Selenium (Se)	<0.01	<0.01	<0.01
Silica (SiO_2)	11	8	13
Vanadium (V)	<0.5	<0.5	<0.5
Aluminum (Al)	NA	NA	<0.1
Barium (Ba)	NA	NA	<0.1
Beryllium (Be)	NA	NA	<0.01
Bismuth (Bi)	NA	NA	<0.01
Cadmium (Cd)	NA	NA	<0.01
Chromium (Cr)	NA	NA	<0.01
Copper (Cu)	NA	NA	<0.01
Gallium (Ga)	NA	NA	<0.05
Germanium (Ge)	NA	NA	<0.1
Lead (Pb)	NA	NA	<0.05
Lithium (Li)	NA	NA	0.16
Manganese (Mn)	NA	NA	<0.01
Nickel (Ni)	NA	NA	<0.05
Strontium (Sr)	NA	NA	0.45
Titanium (Ti)	NA	NA	<0.5
Zinc (Zn)	NA	NA	<0.01
Zirconium (Zr)	NA	NA	<10
Gross Alpha (pCi/l)	NA	NA	0
Gross Beta (pCi/l)	NA	NA	5
Cation/anion (meq/meq)	0.99	1.01	1.00

1/ Concentration of dissolved fraction in mg/l unless otherwise noted.
2/ Not analyzed

Appendix 4-1. Water Quality Data for Station WR-2, RBOSC MDP Aquatic Monitoring Study, 1981

Parameter[1]	April	July	October
Calcium (Ca)	50.0	63.0	50.0
Magnesium (Mg)	12.0	25.0	55.0
Sodium (Na)	26.0	47.0	330
Potassium (K)	1.15	1.55	3.10
Iron (Fe)	<0.05	<0.05	<0.05
Bicarbonate (HCO_3)	120	196	763
Carbonate (CO_3)	<1	2.41	<1
Hydroxide (OH)	<0.5	<0.5	<0.5
Sulfate (SO_4)	122	146	320
Chloride (Cl)	15.1	30.1	75.2
Total Dissolved Solids (TDS)	284	470	1228
Total Suspended Solids (TSS)	13	72	NA[2]
Total Alkalinity (as $CaCO_3$)	118	210	644
Total Hardness (as $CaCO_3$)	174	NA	NA
Total Phosphate (PO_4-P)	<0.01	<0.01	0.07
Ammonia (NH_3-N)	0.15	0.03	<0.01
Nitrate (NO_3-N)	0.03	<0.1	0.2
Fluoride (F)	0.09	0.15	0.99
Bromide (Br)	NA	NA	<2
Dissolved Organic Carbon (DOC)	<3	3	8
Arsenic (As)	<0.01	<0.01	<0.01
Boron (B)	0.27	0.22	1.12
Mercury (Hg)	<0.0003	<0.0003	<0.0003
Molybdenum (Mo)	<0.1	<0.1	<0.3
Selenium (Se)	<0.01	<0.01	<0.01
Silica (SiO_2)	11	8	10
Vanadium (V)	<0.5	<0.5	<0.5
Aluminum (Al)	NA	NA	<0.1
Barium (Ba)	NA	NA	<0.1
Beryllium (Be)	NA	NA	<0.01
Bismuth (Bi)	NA	NA	<0.01
Cadmium (Cd)	NA	NA	<0.01
Chromium (Cr)	NA	NA	<0.01
Copper (Cu)	NA	NA	<0.01
Gallium (Ga)	NA	NA	<0.5
Germanium (Ge)	NA	NA	<0.1
Lead (Pb)	NA	NA	<0.05
Lithium (Li)	NA	NA	0.29
Manganese (Mn)	NA	NA	<0.01
Nickel (Ni)	NA	NA	<0.05
Strontium (Sr)	NA	NA	1.28
Titanium (Ti)	NA	NA	<0.5
Zinc (Zn)	NA	NA	<0.01
Zirconium (Zr)	NA	NA	<10
Gross Alpha (pCi/l)	NA	NA	0
Gross Beta (pCi/l)	NA	NA	23
Cation/anion (meq/meq)	0.95	1.02	1.02

1/ Concentration of dissolved fraction in mg/l unless otherwise noted.
2/ Not analyzed

APPENDIX 4-2

Biotic Components Data and Analyses

APPENDIX 4-2.1

Species Composition of Periphyton at Each Sampling Station for all Sampling Periods in 1981

PERIPHYTON SPECIES LIST

RIO BLANCO OIL SHALE COMPANY
TRACT C-A
1981

TAXON	STATION NUMBER					
	CG-1	YC-1	YC-2	YC-3	WR-1	WR-2
BACILLARIOPHYTA						
ACHNANTHES AFFINIS	X	X	X	X		X
ACHNANTHES EXIGUA					X	X
ACHNANTHES HAUCKIANA			X			
ACHNATHES HAUCKIANA VAR. ROSTRATA		X	X	X		X
ACHNANTHES LANCEOLATA	X	X	X		X	X
ACHNANTHES LANCEOLATA VAR. OUBIA	X	X	X		X	X
ACHNANTHES MICROCEPHALA			X			
ACHNANTHES MINUTISSIMA	X	X	X		X	X
AMPHIPLEURA PELLUCIDA					X	X
AMPHORA COFFEIFORMIS	X	X	X	X		X
AMPHORA OVALIS		X		X	X	X
AMPHORA PERPUSILLA					X	X
AMPHORA VENETA	X	X				
ANOMOEONEIS VITREA		X				
CALONEIS AMPHISBAENA		X			X	
CALONEIS VENTRICOSA			X			
COCCONEIS PEDICULUS		X	X		X	X
COCCONEIS PLACENTULA		X	X	X	X	X
CYCLOTELLA MENEGHINIANA	X	X	X	X	X	X
CYLINDROTHECA GRACILIS		X				
CYMATOPLEURA SOLEA		X			X	X
CYMBELLA AFFINIS		X	X	X	X	X
CYMBELLA CISTULA	X	X	X	X		
CYMBELLA CYMBIFORMIS	X					
CYMBELLA CYMBIFORMIS VAR. NONPUNCTATA				X		
CYMBELLA MINUTA	X	X	X	X	X	X
CYMBELLA MINUTA VAR. SILESIACA	X	X	X	X	X	X
CYMBELLA SINUATA	X	X			X	X
CYMBELLA SP.		X	X			
DENTICULA ELEGANS		X			X	
DIATOMA HIEMALE VAR. MESODON					X	
DIATOMA TENUE		X				
DIATOMA TENUE VAR. ELONGATUM	X	X	X		X	
DIATOMA VULGARE			X	X	X	X
ENTOMONEIS ORNATA		X				
ENTOMONEIS PALUDOSA			X	X		
EPITHEMIA SOREX	X				X	X
EPITHEMIA TURGIDA	X		X		X	X
FRAGILARIA CAPUCINA		X	X		X	X
FRAGILARIA CROTONENSIS		X	X			
FRAGILARIA LEPTOSTAURON						X
FRAGILARIA PINNATA					X	
FRAGILARIA VAUCHERIAE	X	X		X	X	X
FRUSTULIA RHOMBOIDES					X	
GOMPHONEIS HERCULEANA					X	
GOMPHONEMA ANGUSTATUM	X	X	X	X	X	X
GOMPHONEMA DICHOTOMUM				X	X	X
GOMPHONEMA GRACILE			X	X		
GOMPHONEMA INTRICATUM		X	X		X	X
GOMPHONEMA OLIVACEUM	X		X		X	X

GOMPHONEMA PARVULUM		x			x	x
GOMPHONEMA SUBCLAVATUM		x			x	x
GOMPHONEMA SP.		x				
GYROSIGMA SPENCERII		x	x	x	x	x
HANNAEA ARCUS					x	x
HANIZSCHIA AMPHIOXYS	x	x		x	x	x
MASTOGLOIA ELLIPTICA			x			
MASTOGLOIA GREVILLEI		x		x		
MELOSIRA VARIANS					x	
MERIDION CIRCULARE	x				x	
NAVICULA ARVENSIS	x	x	x			
NAVICULA CAPITATA					x	
NAVICULA CINCTA					x	x
NAVICULA CINCTA VAR. ROSTRATA					x	x
NAVICULA CRYPTOCEPHALA	x			x	x	x
NAVICULA CRYPTOCEPHALA VAR. VENETA	x	x	x	x	x	x
NAVICULA CUSPIDATA		x	x		x	x
NAVICULA ELGINENSIS		x	x			
NAVICULA EXIGUA			x		x	x
NAVICULA GASTRUM					x	
NAVICULA HALOPHILA	x	x	x	x		x
NAVICULA HEUFLERI	x	x	x	x	x	x
NAVICULA LANCEOLATA		x			x	x
NAVICULA LUZONENSIS	x	x		x	x	
NAVICULA MENISCULUS VAR. UPSALIENSIS				x		
NAVICULA MINIMA	x	x			x	
NAVICULA MINUSCULA	x					
NAVICULA MUTICA		x				
NAVICULA NOTHA	x	x	x	x	x	x
NAVICULA PELLICULOSA	x	x	x			x
NAVICULA PUPULA					x	
NAVICULA PROTRACTA		x				
NAVICULA PYGMAEA					x	
NAVICULA RADIOSA			x		x	x
NAVICULA RADIOSA VAR. PARVA			x			
NAVICULA RHYNCHOCEPHALA					x	x
NAVICULA SALINARUM				x		x
NAVICULA SALINARUM VAR. INTERMEDIA			x		x	x
NAVICULA SECRETA VAR. APICULATA	x	x	x	x	x	x
NAVICULA TRIPUNCTATA		x	x	x	x	x
NAVICULA TRIPUNCTATA VAR. SCHIZONEMOIDES			x	x	x	x
NAVICULA VIRIDULA	x	x	x	x	x	x
NAVICULA VIRIDULA VAR. AVENACEA	x	x	x	x	x	x
NAVICULA VIRIDULA VAR. LINEARIS					x	x
NAVICULA SP.		x		x		
NEIDIUM SP.					x	
NITZSCHIA ACICULARIS	x	x	x		x	x
NITZSCHIA APICULATA		x	x	x		x
NITZSCHIA DENTICULA	x	x	x	x	x	x
NITZSCHIA DISSIPATA	x	x			x	x
NITZSCHIA EPITHEMOIDES				x		
NITZSCHIA FONTICOLA		x				
NITZSCHIA FRUSTULUM	x	x	x	x	x	x
NITZSCHIA GRACILIS			x		x	x
NITZSCHIA HOLSATICA	x	x	x	x		
NITZSCHIA HUNGARICA		x	x	x	x	x
NITZSCHIA IGNORATA		x	x		x	x
NITZSCHIA LATENS	x		x	x	x	
NITZSCHIA LINEARIS	x	x	x	x	x	x
NITZSCHIA MICROCEPHALA			x	x		
NITZSCHIA PALEA	x	x	x	x	x	x
NITZSCHIA ROMANA		x	x	x		x
NITZSCHIA SIGMOIDEA				x	x	x
NITZSCHIA TRYBLIONELLA VAR. LEVIDENSIS		x	x	x	x	x

NITZSCHIA SP.	x	x			x	x
PINNULARIA BREBISSONII	x			x		x
PINNULARIA MAIOR		x	x			x
PINNULARIA SP.	x	x	x	x	x	
PLEUROSIGMA DELICATISSIMA		x	x	x		
RHOICOSPHENIA CURVATA		x	x		x	x
RHOPALODIA GIBBA	x	x	x	x	x	x
RHOPALODIA GIBBERULA					x	
RHOPALODIA MUSCULUS	x	x	x	x		x
STAURONUS SP.		x		x	x	
SURIRELLA LINEARIS				x	x	
SURIRELLA OVALIS	x	x	x	x		x
SURIRELLA OVATA	x	x	x	x	x	x
SYNEDRA ACUS	x	x	x	x	x	
SYNEDRA FASCICULATA	x	x	x	x	x	x
SYNEDRA MINUSCULA	x	x	x		x	x
SYNEDRA PULCHELLA VAR. LANCEOLATA		x	x	x		x
SYNEDRA ULNA	x	x	x	x	x	x
SYNEDRA ULNA VAR. CONSTRICTA			x			
SYNEDRA ULNA VAR. OXYRHYNCHUS			x			
SYNEDRA SP.		x				
THALASSIOSIRA FLUVIATILIS		x	x	x	x	
UNIDENTIFIED PENNATE DIATOMS				x	x	
CHLOROPHYTA						
BULBOCHAETA SP.	x	x	x	x		
CLADOPHORA SP.	x		x	x	x	x
CLOSTERIUM SP.		x				
DRAPARNALDIA SP.			x			
ENTEROMORPHA SP.		x				
MICROSPORA SP.	x			x	x	x
MOUGEOTIA SP.			x			
SCENEDESMUS QUADRICAUDA			x	x	x	
SPIROGYRA SP.	x					
STIGEOCLONIUM TENUE			x			
ULOTHRIX						x
ULOTHRIX ZONATA					x	
CHRYSOPHYTA						
VAUCHERIA SP.	x					
CYANOPHYTA						
ANABAENA SP.	x		x	x	x	x
CALOTHRIX SP.			x			x
CHAMAESIPHON INCRUSTANS					x	
DACTYLOCOCCOPSIS RAPHIDIOIDES						x
LYNGBYA SP.					x	x
MERISMOPEDIA SP.			x			
NOSTOC SP.			x			
OSCILLATORIA SP.		x	x	x	x	x
PHORMIDIUM SP.	x	x	x		x	x
TOLYPOTHRIX SP.					x	
EUGLENOPHYTA						
EUGLENA SP.				x		

RHODOPHYTA				
AUDOUINELLA VIOLACEA				
BATRACHOSPERMUM SP.			X	X
LEMANEA FUCINA	X			
				X

X = TAXON OBSERVED AT SAMPLING STATION

APPENDIX 4-2.2

Seasonal Changes in Periphyton Species Composition at Each Sampling Station in 1981

PERIPHYTON SPECIES LIST

RIO BLANCO OIL SHALE COMPANY
TRACT C-A

SPECIES OCCURRENCE BY SAMPLING DATE AT STATION CG-1
1981

TAXON	SAMPLING DATE APRIL	JULY	OCTOBER
BACILLARIOPHYTA			
ACHNANTHES AFFINIS	X	X	X
ACHNANTHES LANCEOLATA	X		X
ACHNANTHES LANCEOLATA VAR. DUBIA	X	X	X
ACHNANTHES MINUTISSIMA	X		
AMPHORA COFFEIFORMIS		X	
AMPHORA VENETA	X		
CYCLOTELLA MENEGHINIANA		X	
CYMBELLA CISTULA	X		
CYMBELLA CYMBIFORMIS	X		
CYMBELLA MINUTA	X		
CYMBELLA MINUTA VAR. SILESIACA	X	X	X
CYMBELLA SINUATA	X		
DIATOMA TENUE VAR. ELONGATUM	X	X	
EPITHEMIA SOREX	X		
EPITHEMIA TURGIDA			X
FRAGILARIA VAUCHERIAE	X	X	X
GOMPHONEMA ANGUSTATUM			X
GOMPHONEMA OLIVACEUM	X	X	
HANIZSCHIA AMPHIOXYS		X	
MERIDION CIRCULARE	X	X	
NAVICULA ARVENSIS		X	
NAVICULA CRYPTOCEPHALA		X	
NAVICULA CRYPTOCEPHALA VAR. VENETA	X	X	X
NAVICULA HALOPHILA		X	X
NAVICULA HEUFLERI		X	X
NAVICULA LUZONENSIS		X	
NAVICULA MINIMA		X	
NAVICULA MINUSCULA		X	
NAVICULA NOTHA		X	
NAVICULA PELLICULOSA	X	X	
NAVICULA SECRETA VAR. APICULATA	X	X	X
NAVICULA VIRIDULA	X	X	
NAVICULA VIRIDULA VAR. AVENACEA		X	X
NITZSCHIA ACICULARIS	X	X	
NITZSCHIA DENTICULA	X	X	
NITZSCHIA DISSIPATA		X	
NITZSCHIA FRUSTULUM	X	X	X
NITZSCHIA HOLSATICA	X	X	
NITZSCHIA LATENS	X	X	
NITZSCHIA LINEARIS	X		X
NITZSCHIA PALEA	X	X	X
NITZSCHIA SP.	X		X
PINNULARIA BREBISSONII		X	
PINNULARIA SP.	X		
RHOPALODIA GIBBA	X		
RHOPALODIA MUSCULUS		X	
SURIRELLA OVALIS	X		

SURIRELLA OVATA		X	X
SYNEDRA ACUS	X		
SYNEDRA FASCICULATA	X	X	
SYNEDRA MINUSCULA	X		
SYNEDRA ULNA	X	X	X
CHLOROPHYTA			
BULBOCHAETA SP.			X
CLADOPHORA SP.			X
MICROSPORA SP.	X		
SPIROGYRA SP.	X		
CHRYSOPHYTA			
VAUCHERIA SP.	X		
CYANOPHYTA			
ANABAENA SP.	X		X
PHORMIDIUM SP.			X
EUGLENOPHYTA			
RHODOPHYTA			
BATRACHOSPERMUM SP.	X		

X = TAXON OBSERVED AT SAMPLING STATION

PERIPHYTON SPECIES LIST

RIO BLANCO OIL SHALE COMPANY
TRACT C-A

SPECIES OCCURRENCE BY SAMPLING DATE AT STATION YC-1
1981

TAXON	SAMPLING DATE APRIL	JULY	OCTOBER
BACILLARIOPHYTA			
ACHNANTHES AFFINIS	X	X	X
ACHNATHES HAUCKIANA VAR. ROSTRATA			X
ACHNANTHES LANCEOLATA	X	X	
ACHNANTHES LANCEOLATA VAR. DUBIA		X	X
ACHNANTHES MINUTISSIMA	X	X	
AMPHORA COFFEIFORMIS	X		
AMPHORA OVALIS	X	X	X
AMPHORA VENETA			X
ANOMOEONEIS VITREA			X
CALONEIS AMPHISBAENA			X
COCCONEIS PEDICULUS	X		X
COCCONEIS PLACENTULA	X	X	X
CYCLOTELLA MENEGHINIANA	X	X	X
CYLINDROTHECA GRACILIS			X
CYMATOPLEURA SOLEA			X
CYMBELLA AFFINIS	X		
CYMBELLA CISTULA	X		
CYMBELLA MINUTA	X	X	
CYMBELLA MINUTA VAR. SILESIACA	X	X	X
CYMBELLA SINUATA			X
CYMBELLA SP.	X		
DENTICULA ELEGANS	X		
DIATOMA TENUE		X	
DIATOMA TENUE VAR. ELONGATUM	X		X
ENTOMONEIS ORNATA			X
FRAGILARIA CAPUCINA	X		X
FRAGILARIA CROTONENSIS			X
FRAGILARIA VAUCHERIAE	X	X	X
GOMPHONEMA ANGUSTATUM	X	X	X
GOMPHONEMA INTRICATUM	X		X
GOMPHONEMA PARVULUM	X		
GOMPHONEMA SUBCLAVATUM	X		
GOMPHONEMA SP.	X		
GYROSIGMA SPENCERII			X
HANTZSCHIA AMPHIOXYS			X
MASTOGLOIA GREVILLEI			X
NAVICULA ARVENSIS	X	X	
NAVICULA CRYPTOCEPHALA VAR. VENETA	X	X	X
NAVICULA CUSPIDATA			X
NAVICULA ELGINENSIS	X		
NAVICULA HALOPHILA			X
NAVICULA HEUFLERI	X	X	X
NAVICULA LANCEOLATA	X		
NAVICULA LUZONENSIS		X	
NAVICULA MINIMA		X	
NAVICULA MUTICA			X
NAVICULA NOIHA	X	X	X

NAVICULA PELLICULOSA		x	x
NAVICULA PROTRACTA			x
NAVICULA SECRETA VAR. APICULATA	x	x	x
NAVICULA TRIPUNCTATA			x
NAVICULA VIRIDULA	x	x	
NAVICULA VIRIDULA VAR. AVENACEA			x
NAVICULA SP.			x
NITZSCHIA ACICULARIS		x	
NITZSCHIA APICULATA	x		
NITZSCHIA DENTICULA	x	x	
NITZSCHIA DISSIPATA		x	x
NITZSCHIA FONTICOLA		x	
NITZSCHIA FRUSTULUM	x	x	x
NITZSCHIA HOLSATICA	x		x
NITZSCHIA HUNGARICA			x
NITZSCHIA IGNORATA			x
NITZSCHIA LINEARIS	x		x
NITZSCHIA PALEA	x	x	x
NITZSCHIA ROMANA		x	
NITZSCHIA TRYBLIONELLA VAR. LEVIDENSIS			x
NITZSCHIA SP.			x
PINNULARIA MAIOR	x		x
PINNULARIA SP.	x		x
PLEUROSIGMA DELICATISSIMA			x
RHOICOSPHENIA CURVATA			x
RHOPALODIA GIBBA			x
RHOPALODIA MUSCULUS	x	x	x
STAURONUS SP.			x
SURIRELLA OVALIS			x
SURIRELLA OVATA	x		x
SYNEDRA ACUS	x		
SYNEDRA FASCICULATA	x	x	x
SYNEDRA MINUSCULA	x	x	x
SYNEDRA PULCHELLA VAR. LANCEOLATA			x
SYNEDRA ULNA	x	x	x
SYNEDRA SP.			x
THALASSIOSIRA FLUVIATILIS	x		x
CHLOROPHYTA			
BULBOCHAETA SP.			x
CLOSTERIUM SP.	x		
ENTEROMORPHA SP.	x		
CHRYSOPHYTA			
CYANOPHYTA			
OSCILLATORIA SP.			x
PHORMIDIUM SP.	x		x
EUGLENOPHYTA			
RHODOPHYTA			

PERIPHYTON SPECIES LIST

RIO BLANCO OIL SHALE COMPANY
TRACT C-A

SPECIES OCCURRENCE BY SAMPLING DATE AT STATION YC-2
1981

TAXON	SAMPLING DATE APRIL	JULY	OCTOBER
BACILLARIOPHYTA			
ACHNANTHES AFFINIS	X	X	X
ACHNANTHES HAUCKIANA	X		
ACHNATHES HAUCKIANA VAR. ROSTRATA	X	X	X
ACHNANTHES LANCEOLATA	X		
ACHNANTHES LANCEOLATA VAR. DUBIA		X	X
ACHNANTHES MICROCEPHALA	X		
ACHNANTHES MINUTISSIMA	X	X	
AMPHORA COFFEIFORMIS		X	X
CALONEIS VENTRICOSA	X		
COCCONEIS PEDICULUS		X	X
COCCONEIS PLACENTULA	X	X	X
CYCLOTELLA MENEGHINIANA	X	X	X
CYMBELLA AFFINIS	X	X	X
CYMBELLA CISTULA			X
CYMBELLA MINUTA	X	X	X
CYMBELLA MINUTA VAR. SILESIACA	X	X	X
CYMBELLA SP.	X		
DIATOMA TENUE VAR. ELONGATUM			X
DIATOMA VULGARE			X
ENTOMONEIS PALUDOSA	X		
EPITHEMIA TURGIDA	X		
FRAGILARIA CAPUCINA	X	X	
FRAGILARIA CROTONENSIS			X
GOMPHONEMA ANGUSTATUM		X	
GOMPHONEMA GRACILE			X
GOMPHONEMA INTRICATUM		X	
GOMPHONEMA OLIVACEUM			X
GYROSIGMA SPENCERII		X	X
MASTOGLOIA ELLIPTICA	X		
NAVICULA ARVENSIS	X	X	
NAVICULA CRYPTOCEPHALA VAR. VENETA	X	X	X
NAVICULA CUSPIDATA	X		
NAVICULA ELGINENSIS			X
NAVICULA EXIGUA		X	
NAVICULA HALOPHILA	X		
NAVICULA HEUFLERI	X	X	X
NAVICULA NOTHA	X	X	X
NAVICULA PELLICULOSA		X	
NAVICULA RADIOSA	X		X
NAVICULA RADIOSA VAR. PARVA	X		
NAVICULA SALINARUM VAR. INTERMEDIA			X
NAVICULA SECRETA VAR. APICULATA	X	X	
NAVICULA TRIPUNCTATA	X		
NAVICULA TRIPUNCTATA VAR. SCHIZONEMOIDES			X
NAVICULA VIRIDULA	X		X
NAVICULA VIRIDULA VAR. AVENACEA		X	X
NITZSCHIA ACICULARIS			X

NITZSCHIA APICULATA	X		
NITZSCHIA DENTICULA		X	
NITZSCHIA FRUSTULUM	X	X	X
NITZSCHIA GRACILIS		X	
NITZSCHIA HOLSATICA	X	X	X
NITZSCHIA HUNGARICA	X		X
NITZSCHIA IGNORATA		X	X
NITZSCHIA LATENS	X	X	X
NITZSCHIA LINEARIS	X		X
NITZSCHIA MICROCEPHALA		X	
NITZSCHIA PALEA		X	X
NITZSCHIA ROMANA	X		X
NITZSCHIA TRYBLIONELLA VAR. LEVIDENSIS			X
PINNULARIA MAIOR			X
PINNULARIA SP.	X		
PLEUROSIGMA DELICATISSIMA		X	X
RHOICOSPHENIA CURVATA	X	X	X
RHOPALODIA GIBBA	X	X	X
RHOPALODIA MUSCULUS	X	X	X
SURIRELLA OVALIS	X		X
SURIRELLA OVATA	X		
SYNEDRA ACUS			X
SYNEDRA FASCICULATA	X	X	X
SYNEDRA MINUSCULA	X		X
SYNEDRA PULCHELLA VAR. LANCEOLATA	X	X	
SYNEDRA ULNA	X	X	
SYNEDRA ULNA VAR. CONSTRICTA		X	
SYNEDRA ULNA VAR. OXYRHYNCHUS			X
THALASSIOSIRA FLUVIATILIS			X
CHLOROPHYTA			
BULBOCHAETA SP.	X	X	X
CLADOPHORA SP.	X	X	
DRAPARNALDIA SP.			X
MOUGEOTIA SP.	X		
SCENEDESMUS QUADRICAUDA	X	X	X
STIGEOCLONIUM TENUE	X	X	
CHRYSOPHYTA			
CYANOPHYTA			
ANABAENA SP.	X	X	X
CALOTHRIX SP.	X		X
MERISMOPEDEA SP.	X		
NOSTOC SP.		X	
OSCILLATORIA SP.	X	X	
PHORMIDIUM SP.	X	X	
EUGLENOPHYTA			
RHODOPHYTA			

X = TAXON OBSERVED AT SAMPLING STATION

PERIPHYTON SPECIES LIST

RIO BLANCO OIL SHALE COMPANY
TRACT C-A

SPECIES OCCURRENCE BY SAMPLING DATE AT STATION YC-3
1981

TAXON	SAMPLING DATE APRIL	JULY	OCTOBER
BACILLARIOPHYTA			
ACHNANTHES AFFINIS	X	X	X
ACHNATHES HAUCKIANA VAR. ROSTRATA	X		
AMPHORA COFFEIFORMIS		X	
AMPHORA OVALIS			X
COCCONEIS PLACENTULA	X		
CYCLOTELLA MENEGHINIANA	X	X	X
CYMBELLA AFFINIS			X
CYMBELLA CISTULA		X	X
CYMBELLA CYMBIFORMIS VAR. NONPUNCTATA		X	
CYMBELLA MINUTA	X	X	X
CYMBELLA MINUTA VAR. SILESIACA	X	X	X
DIATOMA VULGARE		X	
ENTOMONEIS PALUDOSA	X		
FRAGILARIA VAUCHERIAE	X		
GOMPHONEMA ANGUSTATUM	X		
GOMPHONEMA DICHOTOMUM		X	X
GOMPHONEMA GRACILE	X		
GYROSIGMA SPENCERII	X	X	
HANTZSCHIA AMPHIOXYS			X
MASTOGLOIA GREVILLEI		X	
NAVICELLA CRYPTOCEPHALA			X
NAVICULA CRYPTOCEPHALA VAR. VENETA	X	X	X
NAVICELLA HALOPHILA	X		
NAVICELLA HEUFLERI	X	X	X
NAVICULA LUZONENSIS			X
NAVICELLA MENISCULUS VAR. UPSALIENSIS	X		
NAVICULA NOTHA	X	X	X
NAVICELLA SALINARUM	X		
NAVICULA SECRETA VAR. APICULATA		X	
NAVICULA TRIPUNCTATA		X	
NAVICELLA TRIPUNCTATA VAR. SCHIZONEMOIDES		X	
NAVICULA VIRIDULA	X	X	X
NAVICELLA VIRIDULA VAR. AVENACEA		X	
NAVICULA SP.	X		X
NITZSCHIA APICULATA	X		
NITZSCHIA DENTICULA	X		
NITZSCHIA EPITHEMOIDES		X	
NITZSCHIA FRUSTULUM	X	X	X
NITZSCHIA HOLSATICA	X	X	
NITZSCHIA HUNGARICA	X	X	
NITZSCHIA LATENS		X	X
NITZSCHIA LINEARIS			X
NITZSCHIA MICROCEPHALA		X	
NITZSCHIA PALEA	X	X	X
NITZSCHIA ROMANA	X	X	X
NITZSCHIA SIGMOIDEA			X
NITZSCHIA TRYBLIONELLA VAR. LEVIDENSIS	X		X

PINNULARIA BREBISSONII			X
PINNULARIA SP.		X	
PLEUROSIGMA DELICATISSIMA		X	X
RHOPALODIA GIBBA	X	X	X
RHOPALODIA MUSCULUS	X	X	X
STAURONIS SP.			X
SURIRELLA LINEARIS	X		
SURIRELLA OVALIS	X	X	X
SURIRELLA OVATA	X		
SYNEDRA ACUS	X		
SYNEDRA FASCICULATA			X
SYNEDRA PULCHELLA VAR. LANCEOLATA	X	X	X
SYNEDRA ULNA	X		
THALASSIOSIRA FLUVIATILIS		X	
UNIDENTIFIED PENNATE DIATOMS			X
CHLOROPHYTA			
BULBOCHAETA SP.	X	X	X
CLADOPHORA SP.	X		
MICROSPORA SP.	X		
SCENEDESMUS QUADRICAUDA	X		
CHRYSOPHYTA			
CYANOPHYTA			
ANABAENA SP.		X	
OSCILLATORIA SP.			X
EUGLENOPHYTA			
EUGLENA SP.	X		
RHODOPHYTA			

X = TAXON OBSERVED AT SAMPLING STATION

PERIPHYTON SPECIES LIST

RIO BLANCO OIL SHALE COMPANY
TRACT C-A

SPECIES OCCURRENCE BY SAMPLING DATE AT STATION WR-1
1981

TAXON	SAMPLING DATE APRIL	JULY	OCTOBER
BACILLARIOPHYTA			
ACHNANTHES EXIGUA	X		
ACHNANTHES LANCEOLATA	X	X	
ACHNANTHES LANCEOLATA VAR. DUBIA	X	X	
ACHNANTHES MINUTISSIMA	X	X	X
AMPHIPLEURA PELLUCIDA			X
AMPHORA OVALIS		X	
AMPHORA PERPUSILLA	X	X	X
CALONEIS AMPHISBAENA	X	X	X
COCCONEIS PEDICULUS	X	X	X
COCCONEIS PLACENTULA	X	X	X
CYCLOTELLA MENEGHINIANA		X	X
CYMATOPLEURA SOLEA	X	X	
CYMBELLA AFFINIS			X
CYMBELLA MINUTA	X	X	
CYMBELLA MINUTA VAR. SILESIACA	X	X	X
CYMBELLA SINUATA	X	X	
DENTICULA ELEGANS			X
DIATOMA HIEMALE VAR. MESODON	X		
DIATOMA TENUE VAR. ELONGATUM		X	
DIATOMA VULGARE	X	X	X
EPITHEMIA SOREX	X	X	X
EPITHEMIA TURGIDA	X	X	
FRAGILARIA CAPUCINA		X	
FRAGILARIA PINNATA			X
FRAGILARIA VAUCHERIAE	X	X	X
FRUSTULIA RHOMBOIDES			X
GOMPHONEIS HERCULEANA	X		
GOMPHONEMA ANGUSTATUM	X		X
GOMPHONEMA DICHOTOMUM		X	X
GOMPHONEMA INTRICATUM	X		X
GOMPHONEMA OLIVACEUM	X	X	X
GOMPHONEMA PARVULUM	X		
GOMPHONEMA SUBCLAVATUM		X	
GYROSIGMA SPENCERII	X	X	X
HANNAEA ARCUS	X		
HANTZSCHIA AMPHIOXYS			X
MELOSIRA VARIANS	X	X	
MERIDION CIRCULARE	X		
NAVICULA CAPITATA		X	
NAVICULA CINCTA		X	X
NAVICULA CINCTA VAR. ROSTRATA			X
NAVICULA CRYPTOCEPHALA	X		X
NAVICULA CRYPTOCEPHALA VAR. VENETA	X	X	X
NAVICULA CUSPIDATA		X	
NAVICULA EXIGUA	X		
NAVICULA GASTRUM			X
NAVICULA HEUFLERI	X	X	X

NAVICULA LANCEOLATA	x	x	
NAVICULA LUZONENSIS	x		
NAVICULA MINIMA	x		x
NAVICULA NOTHA	x	x	x
NAVICULA PUPULA		x	
NAVICULA PYGMAEA			x
NAVICULA RADIOSA			x
NAVICULA RHYNCHOCEPHALA	x	x	x
NAVICULA SALINARUM VAR. INTERMEDIA			x
NAVICULA SECRETA VAR. APICULATA	x		x
NAVICULA TRIPUNCTATA	x		
NAVICULA TRIPUNCTATA VAR. SCHIZONEMOIDES		x	x
NAVICULA VIRIDULA	x	x	
NAVICULA VIRIDULA VAR. AVENACEA		x	x
NAVICULA VIRIDULA VAR. LINEARIS		x	x
NEIDIUM SP.		x	
NITZSCHIA ACICULARIS			x
NITZSCHIA DENTICULA	x		x
NITZSCHIA DISSIPATA	x	x	x
NITZSCHIA FFUSTULUM	x	x	x
NITZSCHIA GRACILIS			x
NITZSCHIA HUNGARICA		x	x
NITZSCHIA IGNORATA	x	x	
NITZSCHIA LATENS			x
NITZSCHIA LINEARIS	x	x	x
NITZSCHIA PALEA	x	x	x
NITZSCHIA SIGMOIDEA	x		x
NITZSCHIA TRYBLIONELLA VAR. LEVIDENSIS	x	x	x
NITZSCHIA SP.	x		x
PINNULARIA SP.	x		
RHOICOSPHENIA CURVATA	x	x	x
RHOPALODIA GIBBA		x	x
RHOPALODIA GIBBERULA		x	x
STAURONUS SP.			x
SURIRELLA LINEARIS			x
SURIRELLA OVATA	x		x
SYNEDRA ACUS	x		
SYNEDRA FASCICULATA			x
SYNEDRA MINUSCULA	x	x	
SYNEDRA ULNA	x	x	x
THALASSIOSIRA FLUVIATILIS			x
UNIDENTIFIED PENNATE DIATOMS	x		
CHLOROPHYTA			
CLADOPHORA SP.	x	x	x
MICROSPORA SP.	x		
SCENEDESMUS QUADRICAUDA			x
ULOTHRIX ZONATA	x		
CHRYSOPHYTA			
CYANOPHYTA			
ANABAENA SP.		x	x
CHAMAESIPHON INCRUSTANS		x	
LYNGBYA SP.			x
OSCILLATORIA SP.	x	x	x
PHORMIDIUM SP.	x	x	x
TOLYPOTHRIX SP.	x		

EUGLENOPHYTA

RHODOPHYTA

AUDOUINELLA VIOLACEA	X	X

X = TAXON OBSERVED AT SAMPLING STATION

PERIPHYTON SPECIES LIST

RIO BLANCO OIL SHALE COMPANY
TRACT C-A

SPECIES OCCURRENCE BY SAMPLING DATE AT STATION WR-2
1981

TAXON	SAMPLING DATE APRIL	JULY	OCTOBER
BACILLARIOPHYTA			
ACHNANTHES AFFINIS	X		X
ACHNANTHES EXIGUA	X		
ACHNATHES HAUCKIANA VAR. ROSTRATA			X
ACHNANTHES LANCEOLATA	X		
ACHNANTHES LANCEOLATA VAR. DUBIA		X	X
ACHNANTHES MINUTISSIMA	X	X	X
AMPHIPLEURA PELLUCIDA			X
AMPHORA COFFEIFORMIS	X		
AMPHORA OVALIS	X		
AMPHORA PERPUSILLA	X	X	X
COCCONEIS PEDICULUS	X	X	X
COCCONEIS PLACENTULA	X	X	X
CYCLOTELLA MENEGHINIANA	X	X	X
CYMATOPLEURA SOLEA			X
CYMBELLA AFFINIS	X		X
CYMBELLA MINUTA	X		
CYMBELLA MINUTA VAR. SILESIACA	X	X	X
CYMBELLA SINUATA	X	X	X
DIATOMA VULGARE	X	X	X
EPITHEMIA SOREX	X	X	X
EPITHEMIA TURGIDA	X	X	X
FRAGILARIA CAPUCINA		X	
FRAGILARIA LEPTOSTAURON	X	X	
FRAGILARIA VAUCHERIAE	X	X	
GOMPHONEMA ANGUSTATUM	X	X	X
GOMPHONEMA DICHOTOMUM		X	X
GOMPHONEMA INTRICATUM	X		X
GOMPHONEMA OLIVACEUM	X	X	X
GOMPHONEMA PARVULUM	X		
GOMPHONEMA SUBCLAVATUM	X		
GYROSIGMA SPENCERII	X	X	X
HANNAEA ARCUS	X		
HANTZSCHIA AMPHIOXYS		X	
NAVICULA CINCTA	X		X
NAVICULA CINCTA VAR. ROSTRATA			X
NAVICULA CRYPTOCEPHALA	X	X	
NAVICULA CRYPTOCEPHALA VAR. VENETA	X	X	X
NAVICULA CUSPIDATA			X
NAVICULA EXIGUA	X		
NAVICULA HALOPHILA	X		
NAVICULA HEUFLERI	X	X	X
NAVICULA LANCEOLATA		X	X
NAVICULA NOTHA	X	X	X
NAVICULA PELLICULOSA		X	
NAVICULA RADIOSA		X	
NAVICULA RHYNCHOCEPHALA	X	X	X
NAVICULA SALINARUM		X	

NAVICULA SALINARUM VAR. INTERMEDIA			x
NAVICULA SECRETA VAR. APICULATA	x	x	x
NAVICULA TRIPUNCTATA	x		
NAVICULA TRIPUNCTATA VAR. SCHIZONEMOIDES		x	x
NAVICULA VIRIDULA	x	x	x
NAVICULA VIRIDULA VAR. AVENACEA		x	x
NAVICULA VIRIDULA VAR. LINEARIS		x	
NITZSCHIA ACICULARIS			x
NITZSCHIA APICULATA	x		
NITZSCHIA DENTICULA	x		
NITZSCHIA DISSIPATA	x	x	x
NITZSCHIA FRUSTULUM	x	x	x
NITZSCHIA GRACILIS		x	
NITZSCHIA HUNGARICA		x	x
NITZSCHIA IGNORATA	x	x	x
NITZSCHIA LINEARIS	x	x	x
NITZSCHIA PALEA	x	x	x
NITZSCHIA ROMANA	x		
NITZSCHIA SIGMOIDEA	x	x	x
NITZSCHIA TRYBLIONELLA VAR. LEVIDENSIS	x		
NITZSCHIA SP.			x
PINNULARIA BREBISSONII		x	
PINNULARIA MAJOR	x		
RHOICOSPHENIA CURVATA	x	x	x
RHOPALODIA GIBBA	x	x	x
RHOPALODIA MUSCULUS			x
SURIRELLA OVALIS	x		x
SURIRELLA OVATA	x		
SYNEDRA FASCICULATA		x	
SYNEDRA MINUSCULA			x
SYNEDRA PULCHELLA VAR. LANCEOLATA	x		
SYNEDRA ULNA	x	x	x
CHLOROPHYTA			
CLADOPHORA SP.	x	x	x
MICROSPORA SP.			x
ULOTHRIX	x		
CHRYSOPHYTA			
CYANOPHYTA			
ANABAENA SP.	x	x	x
CALOTHRIX SP.			x
DACTYLOCOCCOPSIS RAPHIDIOIDES			x
LYNGBYA SP.			x
OSCILLATORIA SP.	x	x	x
PHORMIDIUM SP.	x	x	x
EUGLENOPHYTA			
RHODOPHYTA			
AUDOUINELLA VIOLACEA	x	x	x
LEMANEA FUCINA	x		

APPENDIX 4-2.3

Periphyton Enumeration Data for all
Stations by Sampling Date for 1981

STATION - WR-2 WHITE RIVER
SAMPLE DATE - 100APR
ANALYST - RD

NUMBER OF REPLICATES - 6
AREA SCRAPED - 5000 M2
SUBSAMPLE VOLUME - 10 ML

VARIABLE PARAMETERS	REP1	REP2	REP3	REP4	REP5	REP6
AREA OF TRANSECT (MM2)	.0324	.0324	.0324	.0324	.0324	.0324
NUMBER OF TRANSECTS	5	8	9	13	9	7
NUMBER OF DROPS	12	12	12	9	10	10
COVERSLIP AREA (MM2)	625	625	625	625	625	625
DROPS/ML	50	50	50	50	50	50
ORIGINAL VOLUME (ML)	220	220	220	220	220	220
CONCENTRATE VOLUME (ML)	1.0	1.0	1.0	1.0	1.0	1.0

CODE	TAXON	NUMBER OBSERVED REP1	REP2	REP3	REP4	REP5	REP6
1ACAFF	ACHNANTHES AFFINIS					3	
1ACHAR	ACHNATHES HAUCKIANA VAR. ROSTRATA					2	
1ACLAD	ACHNANTHES LANCEOLATA VAR. DUBIA		1			3	
1ACMIN	ACHNANTHES MINUTISSIMA		1	5		9	4
1AMPEL	AMPHIPLEURA PELLUCIDA						1
1AMPER	AMPHORA PERPUSILLA	6	2	2			
1COCPE	COCCONEIS PEDICULUS	4	14	3	26	22	54
1COCPL	COCCONEIS PLACENTULA			P		1	
1CYCME	CYCLOTELLA MENEGHINIANA	P			2		3
1CYDSO	CYMATOPLEURA SOLEA		1				
1CYMAF	CYMBELLA AFFINIS				P		
1CYMMS	CYMBELLA MINUTA VAR. SILESIACA		P	5	1		1
1CYMSI	CYMBELLA SINUATA			P	P		
1DIVUL	DIATOMA VULGARE	4		2		1	1
1EPSOR	EPITHEMIA SOREX	3	13	34	38	22	25
1EPTUR	EPITHEMIA TURGIDA				1		
1GOANG	GOMPHONEMA ANGUSTATUM	P					P
1GODIC	GOMPHONEMA DICHOTOMUM		P	P	P		
1GOINT	GOMPHONEMA INTRICATUM		P		P		
1GOOLI	GOMPHONEMA OLIVACEUM	P			1		1
1GYSPE	GYROSIGMA SPENCERII		2	P		1	P
1NACIN	NAVICULA CINCTA	P					
1NACIR	NAVICULA CINCTA VAR. ROSTRATA		P	1			
1NACRV	NAVICULA CRYPTOCEPHALA VAR. VENETA	5	1	15	2	5	2
1NACUS	NAVICULA CUSPIDATA					1	
1NAHEU	NAVICULA HEUFLERI			4	2		5
1NALAN	NAVICULA LANCEOLATA		1				
1NANOT	NAVICULA NOTHA	1	F	2	4	4	1
1NARHY	NAVICULA RHYNCHOCEPHALA	1	F	1	2	3	
1NASAI	NAVICULA SALINARUM VAR. INTERMEDIA		F		1		
1NASEA	NAVICULA SECRETA VAR. APICULATA						1
1NATSC	NAVICULA TRIPUNCTATA VAR. SCHIZONEMOIDES	P		P		1	
1NAVIR	NAVICULA VIRIDULA	1					
1NAVIA	NAVICULA VIRIDULA VAR. AVENACEA	1	F	20	15	12	8
1NIACI	NITZSCHIA ACICULARIS				P		
1NIDIS	NITZSCHIA DISSIPATA					1	
1NIFRU	NITZSCHIA FRUSTULUM	4	16	11	10	7	6
1NIHUN	NITZSCHIA HUNGARICA		2	P		2	
1NIIGN	NITZSCHIA IGNORATA	P					

1NIL1N	NITZSCHIA LINEARIS					1	1
1NIPAL	NITZSCHIA PALEA		3	8	1	6	4
1N1SIE	NITZSCHIA SIGMOIDEA	P	1		1		
1NISPP	NITZSCHIA SP.		5	P			
1RHCUR	RHOICOSPHENIA CURVATA	5	P	3	3	6	13
1RHGIV	RHOPALODIA GIBBA	P	2	2	2	1	2
1RHMUS	RHOPALODIA MUSCULUS						P
1SUOVL	SURIRELLA OVALIS		P	1			
1SYMIN	SYNEDRA MINUSCULA			P			
1SYULN	SYNEDRA ULNA				2		
2CLASP	CLADOPHORA SP.	103	112	102	100	100	100
2MICSP	MICROSPORA SP.					P	
4ANASP	ANABAENA SP.	P					
4CALSP	CALOTHRIX SP.	10					
4DACRA	DACTYLOCOCCOPSIS RAPHIDIOIDES				P		
4LYNSP	LYNGBYA SP.	P	P	P		P	
4OSSPP	OSCILLATORIA SP.	P					
4PHSPP	PHORMIDIUM SP.	6	11	27	25	15	10
6ADVIO	AUDOUINELLA VIOLACEA					P	7

P = PRESENT IN SAMPLE BUT NOT OBSERVED ON TRANSECT

PERIPHYTON BENCH SHEET

RIO BLANCO OIL SHALE COMPANY
TRACT C-A

STATION - CG-1 CORRAL GULCH
SAMPLE DATE - 042881
ANALYST - RO

NUMBER OF REPLICATES - 6
AREA SCRAPED - 5000 M2
SUBSAMPLE VOLUME - 10 ML

VARIABLE PARAMETERS	REP1	REP2	REP3	REP4	REP5	REP6
AREA OF TRANSECT (MM2)	.0324	.0324	.0324	.0324	.0324	.0324
NUMBER OF TRANSECTS	22	46	9	18	29	32
NUMBER OF DROPS	12	6	10	15	15	10
COVERSLIP AREA (MM2)	625	625	625	625	625	625
DROPS/ML	50	50	50	50	50	50
ORIGINAL VOLUME (ML)	100	100	100	100	100	100
CONCENTRATE VOLUME (ML)	1.0	1.0	1.0	1.0	1.0	1.0

CODE	TAXON	NUMBER OBSERVED REP1	REP2	REP3	REP4	REP5	REP6
1ACAFF	ACHNANTHES AFFINIS	9					
1ACLAN	ACHNANTHES LANCEOLATA	15		23	3	3	4
1ACLAO	ACHNANTHES LANCEOLATA VAR. OUBIA				P		
1ACMIN	ACHNANTHES MINUTISSIMA			8	P	28	25
1AMVEN	AMPHORA VENETA	2					
1CYMCI	CYMBELLA CISTULA				1		
1CYMCY	CYMBELLA CYMBIFORMIS	2					
1CYMMI	CYMBELLA MINUTA	2					
1CYMMS	CYMBELLA MINUTA VAR. SILESIACA		1		1	1	
1CYMSI	CYMBELLA SINUATA	4					
1DITEE	DIATOMA TENUE VAR. ELONGATUM				2		
1EPSUR	EPITHEMIA SOREX					1	
1FRAVA	FRAGILARIA VAUCHERIAE	4	26	23	30	46	14
1GODLI	GOMPHONEMA OLIVACEUM		1	5			3
1MERCI	MERIDION CIRCULARE					1	
1NACRV	NAVICULA CRYPTOCEPHALA VAR. VENETA	P		1			4
1NAPEL	NAVICULA PELLICULOSA	1					
1NASEA	NAVICULA SECRETA VAR. APICULATA	9	9	4	6	2	29
1NAVIR	NAVICULA VIRIDULA	2	1	P	P	1	10
1NIACI	NITZSCHIA ACICULARIS		3				
1NIDEN	NITZSCHIA DENTICULA				P		
1NIFRU	NITZSCHIA FRUSTULUM	1					
1NIHOL	NITZSCHIA HOLSATICA		15		10	13	45
1NILAT	NITZSCHIA LATENS	2					8
1NILIN	NITZSCHIA LINEARIS	6	3		1	2	7
1NIPAL	NITZSCHIA PALEA				3		
1NISPP	NITZSCHIA SP.	P					
1PISPP	PINNULARIA SP.	1		P		1	P
1RHGIV	RHOPALODIA GIBBA			P			
1SUDVL	SURIRELLA OVALIS			P			
1SYACU	SYNEDRA ACUS			1		2	P
1SYFAS	SYNEDRA FASCICULATA					5	P
1SYMIN	SYNEDRA MINUSCULA				P	2	
1SYULN	SYNEDRA ULNA	P	2	P	4	2	P
2MICSP	MICROSPORA SP.	P	P	P	P		P

2SPISP	SPIROGYRA SP.		8	P			P
3VAUSP	VAUCHERIA SP.		P				
4ANASP	ANABAENA SP.			P		P	
68ASPP	BATRACHOSPERMUM SP.	100	107	102	100	100	106

P = PRESENT IN SAMPLE BUT NOT OBSERVED ON TRANSECT

STATION - YC-1 YELLOW CREEK
SAMPLE DATE - 042881
ANALYST - RD

NUMBER OF REPLICATES - 6
AREA SCRAPED - 5000 M2
SUBSAMPLE VOLUME - 10 ML

VARIABLE PARAMETERS	REP1	REP2	REP3	REP4	REP5	REP6
AREA OF TRANSECT (MM2)	.0324	.0324	.0324	.0324	.0324	.0324
NUMBER OF TRANSECTS	8	8	5	6	8	4
NUMBER OF DROPS	6	15	6	10	10	8
COVERSLIP AREA (MM2)	625	625	625	625	625	625
DROPS/ML	50	50	50	50	50	50
ORIGINAL VOLUME (ML)	250	100	250	100	100	100
CONCENTRATE VOLUME (ML)	1.0	1.0	1.0	1.0	1.0	1.0

		NUMBER OBSERVED					
CODE	TAXON	REP1	REP2	REP3	REP4	REP5	REP6
1ACAFF	ACHNANTHES AFFINIS	100	106	108	122	104	102
1ACLAN	ACHNANTHES LANCEOLATA	19	2	10		5	1
1ACMIN	ACHNANTHES MINUTISSIMA	11					
1AMCOF	AMPHORA COFFEIFORMIS				P		
1AMOVP	AMPHORA OVALIS	1		1	P		P
1COCPE	COCCONEIS PEDICULUS	1				P	
1COCPL	COCCONEIS PLACENTULA	2	P	3		2	3
1CYCME	CYCLOTELLA MENEGHINIANA	42	3	9	1	10	17
1CYMAF	CYMBELLA AFFINIS					1	
1CYMCI	CYMBELLA CISTULA		P	P			
1CYMMI	CYMBELLA MINUTA	5		3	1	1	2
1CYMMS	CYMBELLA MINUTA VAR. SILESIACA	P	6		P	3	
1CYMSP	CYMBELLA SP.		P				
1DEELE	DENTICULA ELEGANS				1		
1DITEE	DIATOMA TENUE VAR. ELONGATUM	6	P	12	P	2	P
1FRACA	FRAGILARIA CAPUCINA		P				
1FRAVA	FRAGILARIA VAUCHERIAE	50	5	10	1	9	9
1GOANG	GOMPHONEMA ANGUSTATUM	P	1		1	P	1
1GOINT	GOMPHONEMA INTRICATUM	2		1			
1GOPAR	GOMPHONEMA PARVULUM				1		
1GOSUB	GOMPHONEMA SUBCLAVATUM	P					
1GOSPP	GOMPHONEMA SP.					P	
1NAARV	NAVICULA ARVENSIS			P	1		1
1NACRV	NAVICULA CRYPTOCEPHALA VAR. VENETA	2	1		7	2	
1NAELG	NAVICULA ELGINENSIS		1	1	3	1	
1NAHEU	NAVICULA HEUFLERI		1			1	
1NALAN	NAVICULA LANCEOLATA	P	1				
1NANOT	NAVICULA NOTHA		1				
1NASEA	NAVICULA SECRETA VAR. APICULATA	6	1	4	1	P	2
1NAVIR	NAVICULA VIRIDULA	P	P	1	P	1	
1NIAPI	NITZSCHIA APICULATA	1		1			

1NIDEN	NITZSCHIA DENTICULA		P	1			
1NIFRU	NITZSCHIA FRUSTULUM	16	1			P	P
1NIHOL	NITZSCHIA HOLSATICA		P				
1NILIN	NITZSCHIA LINEARIS	1		1			2
1NIPAL	NITZSCHIA PALEA		P	1			
1PIMAI	PINNULARIA MAIOR	P					
1PISPP	PINNULARIA SP.				P		P
1RHMUS	RHOPALODIA MUSCULUS	1					
1SUOVA	SURIRELLA OVATA			P			
1SYACU	SYNEDRA ACUS					P	
1SYFAS	SYNEDRA FASCICULATA	1	P	I		5	3
1SYMIN	SYNEDRA MINUSCULA	1	P	8	1		
1SYULN	SYNEDRA ULNA	3	3	2	3	P	2
1THSPP	THALASSIOSIRA FLUVIATILIS	P		P			P
2CLOSP	CLOSTERIUM SP.	P	P	P	P	P	P
2ENSPP	ENTEROMORPHA SP.	40	30	40	5	P	62
4PHSPP	PHORMIDIUM SP.		P				

P = PRESENT IN SAMPLE BUT NOT OBSERVED ON TRANSECT

STATION - YC-2 YELLOW CREEK
SAMPLE DATE - 042881
ANALYST - RD

NUMBER OF REPLICATES - 6
AREA SCRAPED - 5000 M2
SUBSAMPLE VOLUME - 10 ML

VARIABLE PARAMETERS	REP1	REP2	REP3	REP4	REP5	REP6
AREA OF TRANSECT (MM2)	.0324	.0324	.0324	.0324	.0324	.0324
NUMBER OF TRANSECTS	10	8	6	4	4	5
NUMBER OF DROPS	5	4	5	10	10	10
COVERSLIP AREA (MM2)	625	625	625	625	625	625
DROPS/ML	50	50	50	50	50	50
ORIGINAL VOLUME (ML)	100	100	100	100	100	100
CONCENTRATE VOLUME (ML)	1.0	1.0	1.0	1.0	1.0	1.0

CODE	TAXON	NUMBER OBSERVED REP1	REP2	REP3	REP4	REP5	REP6
1ACAFF	ACHNANTHES AFFINIS			2			
1ACHAU	ACHNANTHES HAUCKIANA		2				
1ACHAR	ACHNATHES HAUCKIANA VAR. ROSTRATA			P	P	P	1
1ACLAN	ACHNANTHES LANCEOLATA		I				
1ACMIC	ACHNANTHES MICROCEPHALA	1					
1ACMIN	ACHNANTHES MINUTISSIMA	2	24	P	3	5	
1CAVEN	CALONEIS VENTRICOSA			P	P	1	
1COCPL	COCCONEIS PLACENTULA				P	P	
1CYCME	CYCLOTELLA MENEGHINIANA					P	
1CYMAF	CYMBELLA AFFINIS					P	
1CYMMI	CYMBELLA MINUTA					P	
1CYMMS	CYMBELLA MINUTA VAR. SILESIACA				P		I
1CYMSP	CYMBELLA SP.	P					
1ENPAL	ENTOMONEIS PALUDOSA					2	
1EPTUR	EPITHEMIA TURGIDA				P	P	P
1FRACA	FRAGILARIA CAPUCINA			5	2	7	1
1MAELL	MASTOGLOIA ELLIPTICA	P					
1NAARV	NAVICULA ARVENSIS			1		P	2

1NACRV	NAVICULA CRYPTOCEPHALA VAR. VENETA			1			P
1NACUS	NAVICULA CUSPIDATA						P
1NAHAL	NAVICULA HALOPHILA	P	4		5	P	
1NAHEU	NAVICULA HEUFLERI	P					P
1NANOT	NAVICULA NOTHA		P	P	P	P	P
1NARAD	NAVICULA RADIOSA						P
1NARAP	NAVICULA RADIOSA VAR. PARVA		1				
1NASEA	NAVICULA SECRETA VAR. APICULATA	1					
1NATRI	NAVICULA TRIPUNCTATA						P
1NAVIR	NAVICULA VIRIDULA					P	P
1NIAPI	NITZSCHIA APICULATA					P	
1NIFRU	NITZSCHIA FRUSTULUM	P	8	5	1	24	1
1NIHOL	NITZSCHIA HOLSATICA	11	14	1	12	9	6
1NIHUN	NITZSCHIA HUNGARICA				P		
1NILAT	NITZSCHIA LATENS					P	
1NILIN	NITZSCHIA LINEARIS						P
1NIROM	NITZSCHIA ROMANA			P			P
1PISPP	PINNULARIA SP.					P	
1RHCUR	RHOICOSPHENIA CURVATA		P	P	P	P	
1RHGIV	RHOPALODIA GIBBA	22	10	2	7	15	16
1RHMUS	RHOPALODIA MUSCULUS	5	3	3	P	10	2
1SUDVL	SURIRELLA OVALIS	P			P		
1SUOVA	SURIRELLA OVATA				P	P	
1SYFAS	SYNEDRA FASCICULATA				P		
1SYMIN	SYNEDRA MINUSCULA		1			3	
1SYPUL	SYNEDRA PULCHELLA VAR. LANCEOLATA		3				
1SYULN	SYNEDRA ULNA			P	P	P	
2CHAPR	BULROCHAETA SP.	100	108	100	100	118	112
2CLASP	CLADOPHORA SP.		P				
2MDUSP	MOUGEOTIA SP.				P		
2SCEQU	SCENEDESMUS QUADRICAUDA			P			
2STITE	STIGEOCLONIUM TENUE	P	P	P	P		
4ANASP	ANABAENA SP.	13	29	5	P	P	P
4CALSP	CALOTHRIX SP.	P					
4MESPP	MERISMOPEDEA SP.				P		
4OSSPP	OSCILLATORIA SP.	P					
4PHSPP	PHORMIDIUM SP.	4					

P = PRESENT IN SAMPLE BUT NOT OBSERVED ON TRANSECT

STATION - YC-3 YELLOW CREEK
SAMPLE DATE - 042981
ANALYST - RD

NUMBER OF REPLICATES - 6
AREA SCRAPED - 5000 M2
SUBSAMPLE VOLUME - 10 ML

VARIABLE PARAMETERS	REP1	REP2	REP3	REP4	REP5	REP6
AREA OF TRANSECT (MM2)	.0324	.0324	.0324	.0324	.0324	.0324
NUMBER OF TRANSECTS	6	5	6	4	4	4
NUMBER OF DROPS	15	16	20	20	20	20
COVERSLIP AREA (MM2)	625	625	625	625	625	625
DROPS/ML	50	50	50	50	50	50
ORIGINAL VOLUME (ML)	100	100	100	100	100	100
CONCENTRATE VOLUME (ML)	1.0	1.0	1.0	1.0	1.0	1.0

CODE	TAXON	NUMBER OBSERVED REP1	REP2	REP3	REP4	REP5	REP6

1ACAFF	ACHNANTHES AFFINIS	100	122	112	112	116	118
1ACHAR	ACHNATHES HAUCKIANA VAR. ROSTRATA						P
1COCPL	COCCONEIS PLACENTULA		P				
1CYCHE	CYCLOTELLA MENEGHINIANA	5	2	6	9	2	1
1CYMMI	CYMBELLA MINUTA	P	1	1			
1CYMMS	CYMBELLA MINUTA VAR. SILESIACA	3	5	8	6	40	16
1ENPAL	ENTOMONEIS PALUDOSA	1					
1FRAVA	FRAGILARIA VAUCHERIAE		P			2	
1GOANG	GOMPHONEMA ANGUSTATUM	P	1				
1GOGRA	GOMPHONEMA GRACILE						P
1GYSPE	GYROSIGMA SPENCERII		P				
1NACRV	NAVICULA CRYPTOCEPHALA VAR. VENETA					P	3
1NAHAL	NAVICULA HALOPHILA	1				1	3
1NAHEU	NAVICULA HEUFLERI	P				P	
1NAMEU	NAVICULA MENISCULUS VAR. UPSALIENSIS					1	
1NANOT	NAVICULA NOTHA	3	P	P			
1NASAL	NAVICULA SALINARUM						P
1NAVIR	NAVICULA VIRIDULA						P
1NASPP	NAVICULA SP.			P	P	P	
1NIAPI	NITZSCHIA APICULATA		1			P	
1NIDEN	NITZSCHIA DENTICULA						P
1NIFRU	NITZSCHIA FRUSTULUM	2	P	P			10
1NIHOL	NITZSCHIA HOLSATICA			11			
1NIHUN	NITZSCHIA HUNGARICA	1					
1NIPAL	NITZSCHIA PALEA		P	P			
1NIROM	NITZSCHIA ROMANA	1					
1NITRL	NITZSCHIA TRYBLIONELLA VAR. LEVIDENSIS			1			
1RHGIV	RHOPALODIA GIBBA				P		
1RHMUS	RHOPALODIA MUSCULUS		P				
1SULIN	SURIRELLA LINEARIS				P		
1SUOVL	SURIRELLA OVALIS	1	1	1	1	P	P
1SUOVA	SURIRELLA OVATA	15	6	11	7	12	7
1SYACU	SYNEDRA ACUS	P		P			P
1SYPUL	SYNEDRA PULCHELLA VAR. LANCEOLATA	2			1	32	2
1SYULN	SYNEDRA ULNA				P		
2CHAPR	BULBOCHAETA SP.	104	43	10	107	51	65
2CLASP	CLADOPHORA SP.						P
2MICSP	MICROSPORA SP.					P	
2SCEQU	SCENEDESMUS QUADRICAUDA	P					
5EUSPP	EUGLENA SP.		P				

P = PRESENT IN SAMPLE BUT NOT OBSERVED ON TRANSECT

STATION - WR-1 WHITE RIVER
SAMPLE DATE - 042981
ANALYST - RD

NUMBER OF REPLICATES - 6
AREA SCRAPED - 5000 M2
SUBSAMPLE VOLUME - 10 ML

VARIABLE PARAMETERS	REP1	REP2	REP3	REP4	REP5	REP6
AREA OF TRANSECT (MM2)	.0324	.0324	.0324	.0324	.0324	.0324
NUMBER OF TRANSECTS	15	17	7	4	11	13
NUMBER OF DROPS	7	5	5	6	5	5
COVERSLIP AREA (MM2)	625	625	625	625	625	625
DROPS/ML	50	50	50	50	50	50

ORIGINAL VOLUME (ML)		100	100	100	100	100	100
CONCENTRATE VOLUME (ML)		1.0	1.0	1.0	1.0	1.0	1.0
		NUMBER OBSERVED					
CODE	TAXON	REP1	REP2	REP3	REP4	REP5	REP6
1ACEXI	ACHNANTHES EXIGUA						1
1ACLAN	ACHNANTHES LANCEOLATA			P			
1ACLAD	ACHNANTHES LANCEOLATA VAR. DUBIA	P					
1ACMIN	ACHNANTHES MINUTISSIMA	10	1	P	11	13	14
1AMPER	AMPHORA PERPUSILLA		6	P		4	13
1CAAMP	CALONEIS AMPHISBAENA		P	P	P		
1COCPE	COCCONEIS PEDICULUS	5	1	P	P	1	6
1COCPL	COCCONEIS PLACENTULA	2	2	5	2	1	2
1CYDSO	CYMATOPLEURA SOLEA			P		P	
1CYMMI	CYMBELLA MINUTA		1				
1CYMMS	CYMBELLA MINUTA VAR. SILESIACA	4	3	13	2	1	7
1CYMSI	CYMBELLA SINUATA		1	3		1	2
1DIHIM	DIATOMA HIEMALE VAR. MESODON						P
1DIVUL	DIATOMA VULGARE	15	8	2	3	6	6
1EPSOR	EPITHEMIA SOREX	33	93	10	13	15	12
1EPTUR	EPITHEMIA TURGIDA	1	1				
1FRAVA	FRAGILARIA VAUCHERIAE		2				7
1GOHER	GOMPHONEIS HERCULEANA	P				1	
1GOANG	GOMPHONEMA ANGUSTATUM		P	2			
1GOINT	GOMPHONEMA INTRICATUM		P				
1GOOLI	GOMPHONEMA OLIVACEUM	1	10	1	7	6	7
1GOPAR	GOMPHONEMA PARVULUM	5					
1GYSPE	GYROSIGMA SPENCERII		1	P	1	2	1
1HAARC	HANNAEA ARCUS	1	1		P	P	1
1MELVA	MELOSIRA VARIANS				P		
1MERCI	MERIDION CIRCULARE						P
1NACRY	NAVICULA CRYPTOCEPHALA					1	2
1NACRV	NAVICULA CRYPTOCEPHALA VAR. VENETA		5	1		1	
1NAEXI	NAVICULA EXIGUA						1
1NAHEU	NAVICULA HEUFLERI	4	P				1
1NALAN	NAVICULA LANCEOLATA	5	1	1			
1NALUZ	NAVICULA LUZONENSIS	P					
1NAMIN	NAVICULA MINIMA	3					
1NANOT	NAVICULA NOTHA	5	20	9	3	7	3
1NARHY	NAVICULA RHYNCHOCEPHALA		1	1		1	1
1NASEA	NAVICULA SECRETA VAR. APICULATA	3	1	P	2	2	2
1NATRI	NAVICULA TRIPUNCTATA	3	10	P	3	2	1
1NAVIR	NAVICULA VIRIDULA	72	102	66	44	107	101
1NIDEN	NITZSCHIA DENTICULA		P				
1NIDIS	NITZSCHIA DISSIPATA	5	9	P	P	2	2
1NIFRU	NITZSCHIA FRUSTULUM		9	6		6	13
1NIIGN	NITZSCHIA IGNORATA				P		
1NILIN	NITZSCHIA LINEARIS		P				
1NIPAL	NITZSCHIA PALEA	P	5	P	1	4	3
1NISIE	NITZSCHIA SIGMOIDEA	P		P	P	1	
1NITRL	NITZSCHIA TRYBLIONELLA VAR. LEVIDENSIS		P		P		
1NISPP	NITZSCHIA SP.		13				
1PISPP	PINNULARIA SP.	P		P			
1RHCUR	RHOICOSPHENIA CURVATA	102	40	65	41	89	41
1SUOVA	SURIRELLA OVATA		P	P		2	
1SYACU	SYNEDRA ACUS		P				
1SYMIN	SYNEDRA MINUSCULA	P		P			
1SYULN	SYNEDRA ULNA				1		1
1UNPEN	UNIDENTIFIED PENNATE DIATOMS					3	
2CLASP	CLADOPHORA SP.	87	56	100	103	68	40
2MICSP	MICROSPORA SP.				P		
2ULZON	ULOTHRIX ZONATA			P			

4OSSPP	OSCILLATORIA SP.				P	
4PHSPP	PHORMIDIUM SP.	P	5	P		
4TOSPP	TOLYPOTHRIX SP.			P		
6ADVIO	AUDOUINELLA VIOLACEA				7	

P = PRESENT IN SAMPLE BUT NOT OBSERVED ON TRANSECT

STATION - WR-2 WHITE RIVER
SAMPLE DATE - 042981
ANALYST - RD

NUMBER OF REPLICATES - 6
AREA SCRAPED - 9000 M2
SUBSAMPLE VOLUME - 10 ML

VARIABLE PARAMETERS	REP1	REP2	REP3	REP4	REP5	REP6
AREA OF TRANSECT (MM2)	.0324	.0324	.0324	.0324	.0324	.0324
NUMBER OF TRANSECTS	7	7	8	7	7	4
NUMBER OF DROPS	2	5	5	5	10	10
COVERSLIP AREA (MM2)	625	625	625	625	625	625
DROPS/ML	50	50	50	50	50	50
ORIGINAL VOLUME (ML)	100	100	100	100	100	100
CONCENTRATE VOLUME (ML)	1.0	1.0	1.0	1.0	1.0	1.0

CODE	TAXON	NUMBER OBSERVED REP1	REP2	REP3	REP4	REP5	REP6
1ACAFF	ACHNANTHES AFFINIS	32					
1ACEXI	ACHNANTHES EXIGUA					1	
1ACLAN	ACHNANTHES LANCEOLATA	1					
1ACMIN	ACHNANTHES MINUTISSIMA	104	120	125	121	66	118
1AMCOF	AMPHORA COFFEIFORMIS		P				
1AMOVP	AMPHORA OVALIS					2	
1AMPER	AMPHORA PERPUSILLA	4	2		1	3	
1COCPE	COCCONEIS PEDICULUS	P	1			2	
1COCPL	COCCONEIS PLACENTULA	3		3	P	2	P
1CYCME	CYCLOTELLA MENEGHINIANA				P	P	P
1CYMAF	CYMBELLA AFFINIS		1	P			
1CYMMI	CYMBELLA MINUTA			P			
1CYMMS	CYMBELLA MINUTA VAR. SILESIACA	10	12	21	11	14	6
1CYMSI	CYMBELLA SINUATA					1	
1DIVUL	DIATOMA VULGARE	1	2	1	P	P	3
1EPSOR	EPITHEMIA SOREX	20	11	6	8	7	7
1EPTUR	EPITHEMIA TURGIDA				P		
1FRALE	FRAGILARIA LEPTOSTAURON						1
1FRAVA	FRAGILARIA VAUCHERIAE					1	
1GOANG	GOMPHONEMA ANGUSTATUM	5	2	3	1	1	
1GOINT	GOMPHONEMA INTRICATUM						P
1GOOL1	GOMPHONEMA OLIVACEUM	3				5	P
1GOPAR	GOMPHONEMA PARVULUM	3					
1GOSUB	GOMPHONEMA SUBCLAVATUM			P			
1GYSPE	GYROSIGMA SPENCERII	1	P	P	P	3	
1HAARC	HANNAEA ARCUS	P	1		P	1	
1NACIN	NAVICULA CINCTA	2	P				
1NACRY	NAVICULA CRYPTOCEPHALA						2
1NACRV	NAVICULA CRYPTOCEPHALA VAR. VENETA		1		2	1	3
1NAEXI	NAVICULA EXIGUA	1					
1NAHAL	NAVICULA HALOPHILA	1			1		

1NAHEU	NAVICULA HEUFLERI	3			1		
1NANOT	NAVICULA NOTHA	4	1	6	P	6	
1NARHY	NAVICULA RHYNCHOCEPHALA		P			1	
1NASEA	NAVICULA SECRETA VAR. APICULATA	P	2			9	
1NATRI	NAVICULA TRIPUNCTATA	1		1	1		
1NAVIR	NAVICULA VIRIDULA	31	17	54	20	65	33
1NIAPI	NITZSCHIA APICULATA				P	P	
1NIDEN	NITZSCHIA DENTICULA	P					
1NIDIS	NITZSCHIA DISSIPATA	13	P	1	4	5	5
1NIFRU	NITZSCHIA FRUSTULUM	8	3	7	9	8	1
1NIIGN	NITZSCHIA IGNORATA	3			1		
1NILIN	NITZSCHIA LINEARIS			P			
1NIPAL	NITZSCHIA PALEA	5	4	1	1	5	1
1NIROM	NITZSCHIA ROMANA	P					
1NISIE	NITZSCHIA SIGMOIDEA					P	
1NITRL	NITZSCHIA TRYBLIONELLA VAR. LEVIDENSIS				P		
1PIMAI	PINNULARIA MAIOR			P			
1RHCUR	RHOICOSPHENIA CURVATA	3	3	5	10	3	4
1RHGIV	RHOPALODIA GIBBA					P	
1SUOVL	SURIRELLA OVALIS		P	1	P	P	P
1SUOVA	SURIRELLA OVATA	P	P	1	P	1	1
1SYPUL	SYNEDRA PULCHELLA VAR. LANCEOLATA	1			1		
1SYULN	SYNEDRA ULNA	P				3	
2CLASP	CLADOPHORA SP.		22	63	86	104	23
2ULSPP	ULOTHRIX					P	
4ANASP	ANABAENA SP.		P				
4OSSPP	OSCILLATORIA SP.	P	P			P	
4PHSPP	PHORMIDIUM SP.	7	22	P		12	6
6ADVIO	AUDOUINELLA VIOLACEA			P		11	
6LEFUC	LEMANEA FUCINA	7					

P = PRESENT IN SAMPLE BUT NOT OBSERVED ON TRANSECT

PERIPHYTON BENCH SHEET

RIO BLANCO OIL SHALE COMPANY
TRACT C-A

STATION - CG-1 CORRAL GULCH
SAMPLE DATE - 072081
ANALYST - RD

NUMBER OF REPLICATES - 6
APEA SCRAPED - 5000 M2
SUBSAMPLE VOLUME - 10 ML

VARIABLE PARAMETERS	REP1	REP2	REP3	REP4	REP5	REP6
AREA OF TRANSECT (MM2)	.0324	.0324	.0324	.0324	.0324	.0324
NUMBER OF TRANSECTS	35	34	32	42	29	40
NUMBER OF DROPS	3	5	5	5	5	6
COVERSLIP AREA (MM2)	625	625	625	625	625	625
DROPS/ML	50	50	50	50	50	50
ORIGINAL VOLUME (ML)	100	100	100	100	100	100
CONCENTRATE VOLUME (ML)	1.0	1.0	1.0	1.0	1.0	1.0

CODE	TAXON	NUMBER OBSERVED REP1	REP2	REP3	REP4	REP5	REP6
1ACAFF	ACHNANTHES AFFINIS	13	8	64	66	100	103
1ACLAD	ACHNANTHES LANCEOLATA VAR. OURIA	3	3	18	2	1	
1AMCOF	AMPHORA COFFEIFORMIS					2	
1CYCME	CYCLOTELLA MENEGHINIANA				2		
1CYMMS	CYMBELLA MINUTA VAR. SILESIACA	P	7		3		
1DITEE	DIATOMA TENUE VAR. ELONGATUM	P					
1FRAVA	FRAGILARIA VAUCHERIAE	1	1	1	1		
1GOOL1	GOMPHONEMA OLIVACEUM	3					
1HANAM	HANTZSCHIA AMPHIOXYS	3			1		
1MERCI	MEPIDION CIRCULARE		5				2
1NAARV	NAVICULA ARVENSIS					P	
1NACRY	NAVICULA CRYPTOCEPHALA		P				
1NACRV	NAVICULA CRYPTOCEPHALA VAR. VENETA	2		1	4	5	5
1NAHAL	NAVICULA HALOPHILA		1				
1NAHEU	NAVICULA HEUFLERI	1					
1NALUZ	NAVICULA LUZONENSIS	1					
1NAMIN	NAVICULA MINIMA	P	P				
1NAMIS	NAVICULA MINUSCULA					P	
1NANOT	NAVICULA NOTHA					3	
1NAPEL	NAVICULA PELLICULOSA	1	P			1	
1NASEA	NAVICULA SECRETA VAR. APICULATA	5	6	I	I		
1NAVIR	NAVICULA VIRIDULA	4	I				
1NAVIA	NAVICULA VIRIDULA VAR. AVENACEA				1		
1NIACI	NITZSCHIA ACICULARIS	2				2	
1NIDEN	NITZSCHIA DENTICULA			I			
1NIDIS	NITZSCHIA DISSIPATA	7					4
1NIFRU	NITZSCHIA FRUSTULUM	10	100	100	103	15	75
1NIHOL	NITZSCHIA HOLSATICA		1			1	
1NILAT	NITZSCHIA LATENS					I	
1NIPAL	NITZSCHIA PALEA	3	I		2	I	
1PIBRE	PINNULARIA BREBISSONII		1				
1RHMUS	RHOPALODIA MUSCULUS	9					
1SUOVA	SURIRELLA OVATA	1					
1SYFAS	SYNEDRA FASCICULATA	1					
1SYULN	SYNEDRA ULNA		1			1	

P = PRESENT IN SAMPLE BUT NOT OBSERVED ON TRANSECT

STATION - YC-1 YELLOW CREEK
SAMPLE DATE - 072081
ANALYST - RD

NUMBER OF REPLICATES - 6
AREA SCRAPED - 5000 M2
SUBSAMPLE VOLUME - 10 ML

VARIABLE PARAMETERS	REP1	REP2	REP3	REP4	REP5	REP6
AREA OF TRANSECT (MM2)	.0000	.0324	.0324	.0324	.0324	.0324
NUMBER OF TRANSECTS	0	19	16	25	17	17
NUMBER OF DROPS	0	10	10	14	11	14
COVERSLIP AREA (MM2)	0	625	625	625	625	625
DROPS/ML	0	50	50	50	50	50
ORIGINAL VOLUME (ML)	0	100	100	100	100	100
CONCENTRATE VOLUME (ML)	.0	1.0	1.0	1.0	1.0	1.0

CODE	TAXON	NUMBER OBSERVED REP1	REP2	REP3	REP4	REP5	REP6
1ACAFF	ACHNANTHES AFFINIS		12	3	6	4	45
1ACLAN	ACHNANTHES LANCEOLATA			1			1
1ACLAO	ACHNANTHES LANCEOLATA VAR. OUBIA		33	11	6	5	
1ACMIN	ACHNANTHES MINUTISSIMA		11	10	5	9	3
1AMOVP	AMPHORA OVALIS		3	P	1		
1COCPL	COCCONEIS PLACENTULA		1	P		P	
1CYCME	CYCLOTELLA MENEGHINIANA		5	2		1	6
1CYMMI	CYMBELLA MINUTA				3	1	1
1CYMMS	CYMBELLA MINUTA VAR. SILESIACA		2	1		1	
1DITEN	DIATOMA TENUE			1			
1FRAVA	FRAGILARIA VAUCHERIAE						1
1GOANG	GOMPHONEMA ANGUSTATUM						1
1NAARV	NAVICULA ARVENSIS						2
1NACRV	NAVICULA CRYPTOCEPHALA VAR. VENETA		18	4	18	15	3
1NAHEU	NAVICULA HEUFLERI		6		13	1	
1NALUZ	NAVICULA LUZONENSIS						1
1NAMIN	NAVICULA MINIMA			P	7		
1NANOT	NAVICULA NOTHA		6		2	2	
1NAPEL	NAVICULA PELLICULOSA		16	7	17	30	3
1NASEA	NAVICULA SECRETA VAR. APICULATA		20	2	20	8	6
1NAVIR	NAVICULA VIRIDULA		2	1			
1NIACI	NITZSCHIA ACICULARIS					1	
1NIDEN	NITZSCHIA DENTICULA				1		
1NIDIS	NITZSCHIA DISSIPATA						1
1NIFON	NITZSCHIA FONTICOLA					1	
1NIFRU	NITZSCHIA FRUSTULUM		100	100	102	100	100
1NIPAL	NITZSCHIA PALEA		1	2	1		1
1NIROM	NITZSCHIA ROMANA		1				
1RHMUS	RHOPALODIA MUSCULUS		2	1			
1SYFAS	SYNEDRA FASCICULATA						1
1SYMIN	SYNEDRA MINUSCULA				1	2	
1SYULN	SYNEDRA ULNA				1	1	

P = PRESENT IN SAMPLE BUT NOT OBSERVED ON TRANSECT

STATION - YC-2 YELLOW CREEK
SAMPLE DATE - 072181
ANALYST - RD

NUMBER OF REPLICATES - 6
AREA SCRAPED - 5000 M2
SUBSAMPLE VOLUME - 10 ML

VARIABLE PARAMETERS	REP1	REP2	REP3	REP4	REP5	REP6
AREA OF TRANSECT (MM2)	.0324	.0324	.0324	.0324	.0000	.0324
NUMBER OF TRANSECTS	4	6	5	5	0	5
NUMBER OF DROPS	10	9	10	10	0	20
COVERSLIP AREA (MM2)	625	625	625	625	0	625
DROPS/ML	50	50	50	50	0	50
ORIGINAL VOLUME (ML)	100	100	100	100	0	100
CONCENTRATE VOLUME (ML)	1.0	1.0	1.0	1.0	.0	1.0

CODE	TAXON	NUMBER OBSERVED REP1	REP2	REP3	REP4	REP5	REP6
1ACAFF	ACHNANTHES AFFINIS	46	1	11			43
1ACHAR	ACHNATHES HAUCKIANA VAR. POSTRATA		34	P	1		P
1ACLAO	ACHNANTHES LANCEOLATA VAR. DUBIA	P	1	P			
1ACMIN	ACHNANTHES MINUTISSIMA			P	P		
1AMCOF	AMPHORA COFFEIFORMIS		P	1	P		
1COCPE	COCCONEIS PEDICULUS			2			1
1COCPL	COCCONEIS PLACENTULA		1	P	P		
1CYCME	CYCLOTELLA MENEGHINIANA	2	1	4	P		P
1CYMAF	CYMBELLA AFFINIS	P					P
1CYMMI	CYMBELLA MINUTA			P	P		
1CYMMS	CYMBELLA MINUTA VAR. SILESIACA			1			P
1FRALA	FRAGILARIA CAPUCINA						2
1GOANG	GOMPHONEMA ANGUSTATUM			1			
1GOINT	GOMPHONEMA INTRICATUM	1					P
1GYSPE	GYROSIGMA SPENCERII	P	P				
1NAARV	NAVICULA ARVENSIS	3					
1NACRV	NAVICULA CRYPTOCEPHALA VAR. VENETA	1		P			
1NAEXI	NAVICULA EXIGUA	P					
1NAHEU	NAVICULA HEUFLERI			P			
1NANOT	NAVICULA NOTHA			P			P
1NAPEL	NAVICULA PELLICULOSA			P			
1NASEA	NAVICULA SECRETA VAR. APICULATA				P		
1NAVIA	NAVICULA VIRIDULA VAR. AVENACEA						P
1NIDEN	NITZSCHIA DENTICULA			1			
1NIFRU	NITZSCHIA FRUSTULUM	110	79	100	81		25
1NIGPA	NITZSCHIA GRACILIS			P	P		
1NIHOL	NITZSCHIA HOLSATICA			P	3		
1NIIGN	NITZSCHIA IGNORATA	1					
1NILAT	NITZSCHIA LATENS		2				
1NIMIC	NITZSCHIA MICROCEPHALA	P					
1NIPAL	NITZSCHIA PALEA	2	1		1		P
1PLDEL	PLEUROSIGMA DELICATISSIMA			1			
1RHCUR	RHOICOSPHENIA CURVATA	1	1	P	1		P
1RHGIV	RHOPALODIA GIBBA	1	5	1	1		
1RHMUS	RHOPALODIA MUSCULUS	1	P		2		
1SYFAS	SYNEDRA FASCICULATA	3	2	P	P		P
1SYPUL	SYNEDRA PULCHELLA VAR. LANCEOLATA	P	2		21		
1SYULN	SYNEDRA ULNA	1		P	1		

1SYULC	SYNEDRA ULNA VAR. CONSTRICTA					1
2CHAPR	BULBOCHAETA SP.		20	44	103	103
2CLASP	CLADOPHORA SP.		16	P		
2SCEQU	SCENEDESMUS QUADRICAUDA					1
2STITE	STIGEOCLONIUM TENUE	48	101			
4ANASP	ANABAENA SP.		P	P		
4NOSPP	NOSTOC SP.			P		
4OSSPP	OSCILLATORIA SP.	P				
4PHSPP	PHORMIDIUM SP.	P				

P = PRESENT IN SAMPLE BUT NOT OBSERVED ON TRANSECT

STATION - YC-3 YELLOW CREEK
SAMPLE DATE - 072181
ANALYST - RD

NUMBER OF REPLICATES - 6
AREA SCRAPED - 5000 M2
SUBSAMPLE VOLUME - 10 ML

VARIABLE PARAMETERS	REP1	REP2	REP3	REP4	REP5	REP6
AREA OF TRANSECT (MM2)	.0324	.0324	.0324	.0324	.0324	.0324
NUMBER OF TRANSECTS	5	7	11	7	8	8
NUMBER OF DROPS	10	10	10	6	7	7
COVERSLIP AREA (MM2)	625	625	625	625	625	625
DROPS/ML	50	50	50	50	50	50
ORIGINAL VOLUME (ML)	100	100	100	100	100	100
CONCENTRATE VOLUME (ML)	1.0	1.0	1.0	1.0	1.0	1.0

CODE	TAXON	NUMBER OBSERVED REP1	REP2	REP3	REP4	REP5	REP6
1ACAFF	ACHNANTHES AFFINIS	18	42	19	7	13	15
1AMCOF	AMPHORA COFFEIFORMIS			2	2		
1CYCME	CYCLOTELLA MENEGHINIANA	3	P	1	P		3
1CYMC1	CYMBELLA CISTULA		P		1		P
1CYMCN	CYMBELLA CYMBIFORMIS VAR. NONPUNCTATA	3					
1CYMMI	CYMBELLA MINUTA				1		
1CYMMS	CYMBELLA MINUTA VAR. SILESIACA		1	P			1
1DIVUL	DIATOMA VULGARE				P		
1GODIC	GOMPHONEMA DICHOTOMUM	P					
1GYSPE	GYROSIGMA SPENCERII	1					
1MAGRE	MASTOGLOIA GREVILLEI						P
1NACRV	NAVICULA CRYPTOCEPHALA VAR. VENETA		2	1			P
1NAHEU	NAVICULA HEUFLERI	P					1
1NANOT	NAVICULA NOTHA	P			P		
1NASEA	NAVICULA SECRETA VAR. APICULATA	1	P	P	2		1
1NATR1	NAVICULA TRIPUNCTATA		P		1		
1NATSC	NAVICULA TRIPUNCTATA VAR. SCHIZONEMOIDES						1
1NAVIR	NAVICULA VIRIDULA	5	P	1	2	1	
1NAVIA	NAVICULA VIRIDULA VAR. AVENACEA						P
1NIEPI	NITZSCHIA EPITHEMOIDES						P
1NIFRU	NITZSCHIA FRUSTULUM	3	P	2	4		1
1NIHOL	NITZSCHIA HOLSATICA			4			P
1NIHUN	NITZSCHIA HUNGARICA				1	2	P
1NILAT	NITZSCHIA LATENS		1	1			
1NIMIC	NITZSCHIA MICROCEPHALA						P
1NIPAL	NITZSCHIA PALEA		2	4	1		P

1NIROM	NITZSCHIA ROMANA		1				
1PISPP	PINNULARIA SP.		1			1	
1PLDEL	PLEUROSIGMA DELICATISSIMA		P				
1RHGIV	RHOPALODIA GIBBA		2				
1RHMUS	RHOPALODIA MUSCULUS	11		P	6	6	
1SUOVL	SURIRELLA OVALIS				I	3	
1SYPUL	SYNEDRA PULCHELLA VAR. LANCEOLATA		4				
1THSPP	THALASSIOSIRA FLUVIATILIS	2					
2CHAPR	BULBOCHAETA SP.	101	100	105	109	106	104
4ANASP	ANABAENA SP.	2		1			

P = PRESENT IN SAMPLE BUT NOT OBSERVED ON TRANSECT

STATION - WR-1 WHITE RIVER
SAMPLE DATE - 072181
ANALYST - RD

NUMBER OF REPLICATES - 6
AREA SCRAPED - 5000 M2
SUBSAMPLE VOLUME - 10 ML

VARIABLE PARAMETERS	REP1	REP2	REP3	REP4	REP5	REP6
AREA OF TRANSECT (MM2)	.0324	.0324	.0324	.0324	.0324	.0324
NUMBER OF TRANSECTS	6	7	8	5	10	6
NUMBER OF DROPS	10	6	6	8	7	10
COVERSLIP AREA (MM2)	625	625	625	625	625	625
DROPS/ML	50	50	50	50	50	50
ORIGINAL VOLUME (ML)	100	100	100	100	100	100
CONCENTRATE VOLUME (ML)	1.0	1.0	1.0	1.0	1.0	1.0

		NUMBER OBSERVED					
CODE	TAXON	REP1	REP2	REP3	REP4	REP5	REP6
1ACLAN	ACHNANTHES LANCEOLATA	1					
1ACLAD	ACHNANTHES LANCEOLATA VAR. OURIA		1				I
1ACMIN	ACHNANTHES MINUTISSIMA			16			
1AMOVP	AMPHORA OVALIS					P	
1AMPER	AMPHORA PERPUSILLA			6	2	P	
1CAAMP	CALONEIS AMPHISPAENA		P				
1COCPE	COCCONEIS PEDICULUS	60	10	5	39	38	45
1COCPL	COCCONEIS PLACENTULA	30	6	12			I
1CYCME	CYCLOTELLA MENEGHINIANA			2		P	
1CYDSO	CYMATOPLEURA SOLEA		1		1		
1CYMMI	CYMBELLA MINUTA		1				
1CYMMS	CYMBELLA MINUTA VAR. SILESIACA			2	3	1	
1CYMSI	CYMBELLA SINUATA					P	P
1DITEE	DIATOMA TENUE VAR. ELONGATUM				1		
1DIVUL	DIATOMA VULGARE	1	I	2	2	2	1
1EPSOR	EPITHEMIA SOREX	102	78	31	35	52	34
1EPTUR	EPITHEMIA TURGIDA		P				
1FRACA	FRAGILARIA CAPUCINA						1
1FRAVA	FRAGILARIA VAUCHERIAE				1		
1GODIC	GOMPHONEMA DICHOTOMUM						1
1GOOLI	GOMPHONEMA OLIVACEUM	1	P		2	P	I
1GOSUB	GOMPHONEMA SUBCLAVATUM		P				
1GYSPE	GYROSIGMA SPENCERII	1		1			
1MELVA	MELOSIRA VARIANS			P			
1NACAP	NAVICULA CAPITATA		P				

1NACIN	NAVICULA CINCTA						P
1NACRV	NAVICULA CRYPTOCEPHALA VAR. VENETA		1	2		2	P
1NACUS	NAVICULA CUSPIDATA	1					
1NAHEU	NAVICULA HEUFLERI		5	6		P	P
1NALAN	NAVICULA LANCEOLATA		1	3	1		
1NANOT	NAVICULA NOINA		16	1	4	1	P
1NAPUP	NAVICULA PUPULA		P				P
1NARHY	NAVICULA RHYNCHOCEPHALA	1	P		1		P
1NATSC	NAVICULA TRIPUNCIATA VAR. SCHIZONEMOIDES	1	6	5	2		P
1NAVIR	NAVICULA VIRIDULA	26	4				
1NAVIA	NAVICULA VIRIDULA VAR. AVENACEA			2	7	3	3
1NAVIL	NAVICULA VIRIDULA VAR. LINEARIS			1		1	
1NESPP	NEIDIUM SP.		P				
1NIOIS	NITZSCHIA OISSIPATA		P	P			2
1NIFRU	NITZSCHIA FRUSTULUM		4	15	1	5	
1NIHUN	NITZSCHIA HUNGARICA						P
1NIIGN	NITZSCHIA IGNORATA		P				
1NILIN	NITZSCHIA LINEARIS				1	I	P
1NIPAL	NITZSCHIA PALEA		1	2		1	
1NITRL	NITZSCHIA TRYBLIONELLA VAR. LEVIDENSIS		1				
1RHCUR	RHOICOSPHENIA CURVATA	9	2	9	13	6	5
1RHGIV	RHOPALODIA GIBBA			P		P	2
1RHGIB	RHOPALODIA GIBBERULA					1	
1SYMIN	SYNEDRA MINUSCULA					P	
1SYULN	SYNEDRA ULNA	1	P	1	2	P	P
2CLASP	CLADOPHORA SP.	80	100	106	100	100	100
4ANASP	ANABAENA SP.		P	P			
4CHAM1	CHAMAESIPHON INCRUSTANS		P				
4OSSPP	OSCILLATORIA SP.		1				
4PHSPP	PHORMIDIUM SP.		P	P	5	16	9
6ADV1D	AUDOUINELLA VIOLACEA		7	13		P	

P = PRESENT IN SAMPLE BUT NOT OBSERVED ON TRANSECT

STATION - WR-2 WHITE RIVER
SAMPLE DATE - 072181
ANALYST - RD

NUMBER OF REPLICATES - 6
AREA SCRAPED - 5000 M2
SUBSAMPLE VOLUME - 10 ML

VARIABLE PARAMETERS	REP1	REP2	REP3	REP4	REP5	REP6
AREA OF TRANSECT (MM2)	.0000	.0324	.0324	.0324	.0324	.0324
NUMBER OF TRANSECTS	0	7	7	5	5	7
NUMBER OF DROPS	0	8	6	8	8	8
COVERSLIP AREA (MM2)	0	625	625	625	625	625
DROPS/ML	0	50	50	50	50	50
ORIGINAL VOLUME (ML)	0	100	100	100	100	100
CONCENTRATE VOLUME (ML)	.0	1.0	2.0	2.0	2.0	2.0

		NUMBER OBSERVED					
CODE	TAXON	REP1	REP2	REP3	REP4	REP5	REP6
1ACLAD	ACHNANTHES LANCEOLATA VAR. DURIA				P		
1ACMIN	ACHNANTHES MINUTISSIMA			1			P
1AMPEF	AMPHORA PERPUSILLA			P			
1COCPE	COCCONEIS PEDICULUS		73	63	33	41	24

1COCPL	COCCONEIS PLACENTULA		P	1		1
1CYCME	CYCLOTELLA MENEGHINIANA				P	
1CYMMS	CYMBELLA MINUTA VAR. SILESIACA	1	5	P		1
1CYMSI	CYMBELLA SINUATA				P	
1DIVUL	DIATOMA VULGARE	1	P	1	1	2
1EPSOR	EPITHEMIA SOREX	46	52	34	12	73
1EPTUR	EPITHEMIA TURGIDA		P			
1FRACA	FRAGILARIA CAPUCINA				P	
1FRALE	FRAGILARIA LEPTOSTAURON	1				
1FRAVA	FRAGILARIA VAUCHERIAE		3	P		P
1GOANG	GOMPHONEMA ANGUSTATUM.				P	
1GODIC	GOMPHONEMA DICHOTOMUM				P	
1GOOLI	GOMPHONEMA OLIVACEUM	2	P		1	3
1GYSPE	GYROSIGMA SPENCERII		P	P		
1HANAM	HANTZSCHIA AMPHIOXYS	P				
1NACRY	NAVICULA CRYPTOCEPHALA			1		1
1NACRV	NAVICULA CRYPTOCEPHALA VAR. VENETA				P	
1NAHEU	NAVICULA HEUFLERI		5	3	2	P
1NALAN	NAVICULA LANCEOLATA			P	P	1
1NANOT	NAVICULA NOTHA	2	1	1	5	P
1NAPEL	NAVICULA PELLICULOSA			1		
1NARAD	NAVICULA RADIOSA				P	
1NARHY	NAVICULA RHYNCHOCEPHALA	P		1		
1NASAL	NAVICULA SALINARUM					P
1NASEA	NAVICULA SECRETA VAR. APICULATA					P
1NATSC	NAVICULA TRIPUNCTATA VAR. SCHIZONEMOIDES	2	1	P		2
1NAVIR	NAVICULA VIRIDULA					3
1NAVIA	NAVICULA VIRIDULA VAR. AVENACEA	1	P	2	P	
1NAVIL	NAVICULA VIRIDULA VAR. LINEARIS		P	P	1	
1NIDIS	NITZSCHIA DISSIPATA	1	P		P	1
1NIFRU	NITZSCHIA FRUSTULUM	8	P	4	7	5
1NIGRA	NITZSCHIA GRACILIS			P		
1NIHUN	NITZSCHIA HUNGARICA		1	1		
1NIIGN	NITZSCHIA IGNORATA					1
1NILIN	NITZSCHIA LINEARIS	1	P		P	
1NIPAL	NITZSCHIA PALEA	1		1	P	P
1NISIE	NITZSCHIA SIGMOIDEA		P			
1PIBRE	PINNULARIA BREBISSONII	P		P		
1RHCUR	RHOICOSPHENIA CURVATA	9	24	4	2	20
1RHGIV	RHOPALODIA GIBBA					P
1SYFAS	SYNEDRA FASCICULATA	P				P
1SYULN	SYNEDRA ULNA	P		P		
2CLASP	CLADOPHORA SP.	100	113	100	102	100
4ANASP	ANABAENA SP.		3	P	P	
4OSSPP	OSCILLATORIA SP.		P		2	
4PHSPP	PHORMIDIUM SP.	42	P	6	15	5
6ADVIO	AUDOUINELLA VIOLACEA	13				

P = PRESENT IN SAMPLE BUT NOT OBSERVED ON TRANSECT

PERIPHYTON BENCH SHEET

RIO BLANCO OIL SHALE COMPANY
TRACT C-A

STATION - CG-1 CORRAL GULCH
SAMPLE DATE - 100981
ANALYST - RD

NUMBER OF REPLICATES - 6
AREA SCRAPED - 5000 M2
SUBSAMPLE VOLUME - 10 ML

VARIABLE PARAMETERS	REP1	REP2	REP3	REP4	REP5	REP6
AREA OF TRANSECT (MM2)	.0324	.0324	.0324	.0324	.0324	.0324
NUMBER OF TRANSECTS	21	16	35	25	31	16
NUMBER OF CROPS	24	10	10	3	5	20
COVERSLIP AREA (MM2)	625	625	625	625	625	625
DROPS/ML	50	50	50	50	50	50
ORIGINAL VOLUME (ML)	100	100	100	100	100	100
CONCENTRATE VOLUME (ML)	1.0	1.0	1.0	1.0	1.0	1.0

CODE	TAXON	NUMBER OBSERVED REP1	REP2	REP3	REP4	REP5	REP6
1ACAFF	ACHNANTHES AFFINIS		13				
1ACLAN	ACHNANTHES LANCEOLATA						1
1ACLAD	ACHNANTHES LANCEOLATA VAR. DUBIA	100	102	34			
1CYMMS	CYMBELLA MINUTA VAR. SILESIACA	3	1		1		
1EPTUR	EPITHEMIA TURGIDA					1	
1FRAVA	FRAGILARIA VAUCHERIAE		4				
1GOANG	GOMPHONEMA ANGUSTATUM	2					
1NACRV	NAVICULA CRYPTOCEPHALA VAR. VENETA		5		1	1	9
1NAHAL	NAVICULA HALOPHILA						1
1NAHEU	NAVICULA HEUFLERI						1
1NASEA	NAVICULA SECRETA VAR. APICULATA	2	13	1	23	22	105
1NAVIA	NAVICULA VIRIDULA VAR. AVENACEA	1					4
1NIFRU	NITZSCHIA FRUSTULUM	27	5	100	103	101	9
1NILIN	NITZSCHIA LINEARIS		1		1		
1NIPAL	NITZSCHIA PALEA		P		9		
1NISPP	NITZSCHIA SP.			2			
1SUOVA	SURIRELLA OVATA		3				
1SYULN	SYNEDRA ULNA	1	2				
2CHAPR	BULBOCHAETA SP.		3				
2CLASP	CLADOPHORA SP.		20				
4ANASP	ANABAENA SP.		1				
4PHSPP	PHORMIDIUM SP.				53	7	

P = PRESENT IN SAMPLE BUT NOT OBSERVED ON TRANSECT

STATION - YC-1 YELLOW CREEK
SAMPLE DATE - 100981
ANALYST - RD

NUMBER OF REPLICATES - 6
AREA SCRAPED - 5000 M2

SUBSAMPLE VOLUME - 10 ML

VARIABLE PARAMETERS	REP1	REP2	REP3	REP4	REP5	REP6
AREA OF TRANSECT (MM2)	.0324	.0324	.0324	.0324	.0324	.0324
NUMBER OF TRANSECTS	6	7	7	7	7	6
NUMBER OF DROPS	15	15	20	15	25	25
COVERSLIP AREA (MM2)	625	625	625	625	625	625
DROPS/ML	50	50	50	50	50	50
ORIGINAL VOLUME (ML)	100	100	100	100	100	100
CONCENTRATE VOLUME (ML)	1.0	1.0	1.0	1.0	1.0	1.0

CODE	TAXON	NUMBER OBSERVED REP1	REP2	REP3	REP4	REP5	REP6
1ACAFF	ACHNANTHES AFFINIS	85	66	43	58	73	48
1ACHAR	ACHNANTHES HAUCKIANA VAR. ROSTRATA		5	P	P		
1ACLAO	ACHNANTHES LANCEOLATA VAR. OUBIA		3	P	3	2	
1AMOVP	AMPHORA OVALIS		2				
1AMVEN	AMPHORA VENETA			P			
1ANVIT	ANOMOEONEIS VITREA			P			
1CAAMP	CALONEIS AMPHISBAENA		P				
1COCPE	COCCONEIS PEDICULUS	P	1	1	3		
1COCPL	COCCONEIS PLACENTULA	1	1	2	P	3	P
1CYCHE	CYCLOTELLA MENEGHINIANA	8	3	5	3	P	10
1CYGRA	CYLINDROTHECA GRACILIS				P		
1CYOSO	CYMATOPLEURA SOLEA	P					
1CYMMS	CYMBELLA MINUTA VAR. SILESIACA				P		
1CYMSI	CYMBELLA SINUATA		P	1			
1DITEE	DIATOMA TENUE VAR. ELONGATUM			P	P		
1ENORN	ENTOMONEIS ORNATA		2				
1FRACA	FRAGILARIA CAPUCINA					P	P
1FRACR	FRAGILARIA CROTONENSIS			P		P	P
1FRAVA	FRAGILARIA VAUCHERIAE			P	P		
1GOANG	GOMPHONEMA ANGUSTATUM	5	9		P	10	23
1GOINT	GOMPHONEMA INTRICATUM			P			
1GYSPE	GYROSIGMA SPENCERII		2			P	P
1HANAM	HANTZSCHIA AMPHIOXYS			P	3		P
1MAGRE	MASTOGLOIA GREVILLEI			1			
1NACRV	NAVICULA CRYPTOCEPHALA VAR. VENETA	3	4	4	1		2
1NACUS	NAVICULA CUSPIDATA		P				
1NAHAL	NAVICULA HALOPHILA		P	P		1	
1NAHEU	NAVICULA HEUFLERI				P	1	P
1NAMUT	NAVICULA MUTICA			P			
1NANOT	NAVICULA NOTHA	6		6	3	8	1
1NAPEL	NAVICULA PELLICULOSA	P	1		P		
1NAPRO	NAVICULA PROTRACTA	1			1		
1NASEA	NAVICULA SECRETA VAR. APICULATA		P	1	P	2	13
1NATRI	NAVICULA TRIPUNCTATA			P			
1NAVIA	NAVICULA VIRIDULA VAR. AVENACEA	1	1	P		1	P
1NASPP	NAVICULA SP.	P					
1NIDIS	NITZSCHIA DISSIPATA				1		
1NIFRU	NITZSCHIA FRUSTULUM	74	116	110	100	100	93
1NIHOL	NITZSCHIA HOLSATICA		P				
1NIHUN	NITZSCHIA HUNGARICA		2				P
1NIIGN	NITZSCHIA IGNOPATA		1				
1NILIN	NITZSCHIA LINEARIS	P	P	P			
1NIPAL	NITZSCHIA PALEA	1	5	1	P	P	
1NITRL	NITZSCHIA TRYBLIONELLA VAR. LEVIDENSIS			1			
1NISPP	NITZSCHIA SP.				1		
1PIMAI	PINNULARIA MAIOR						P
1PISPP	PINNULARIA SP.	P	1	P			
1PLOEL	PLEUROSIGMA DELICATISSIMA			1			

1RHCUR	RHOICOSPHENIA CURVATA			P			
1RHGIV	RHOPALODIA GIBBA	1	1	2	P	P	
1RHMUS	RHOPALODIA MUSCULUS	P	P	6	11	7	13
1STASP	STAURONIS SP.	P		1			P
1SUOVL	SURIRELLA OVALIS		P				
1SUOVA	SURIRELLA OVATA	P	P				
1SYFAS	SYNEDRA FASCICULATA		P	P			
1SYMIN	SYNEDRA MINUSCULA			P	1		P
1SYPUL	SYNEDRA PULCHELLA VAR. LANCEOLATA	P					
1SYULN	SYNEDRA ULNA					1	1
1SYSPP	SYNEDRA SP.			P	1		
1THSPP	THALASSIOSIRA FLUVIATILIS		3			1	P
2CHAPR	PULSOCHAETA SP.	104	50	30	30	90	100
4OSSPP	OSCILLATORIA SP.		P				
4PHSPP	PHORMIDIUM SP.				P		

P = PRESENT IN SAMPLE BUT NOT OBSERVED ON TRANSECT

STATION - YC-2 YELLOW CREEK
SAMPLE DATE - 100881
ANALYST - RD

NUMBER OF REPLICATES - 6
AREA SCRAPED - 5000 M2
SUBSAMPLE VOLUME - 10 ML

VARIABLE PARAMETERS	REP1	REP2	REP3	REP4	REP5	REP6
AREA OF TRANSECT (MM2)	.0324	.0324	.0324	.0324	.0324	.0324
NUMBER OF TRANSECTS	4	4	4	4	3	4
NUMBER OF DROPS	10	10	8	10	10	13
COVERSLIP AREA (MM2)	625	625	625	625	625	625
DROPS/ML	50	50	50	50	50	50
ORIGINAL VOLUME (ML)	150	100	100	150	100	100
CONCENTRATE VOLUME (ML)	1.0	1.0	1.0	1.0	1.0	1.0

CODE	TAXON	NUMBER OBSERVED REP1	REP2	REP3	REP4	REP5	REP6
1ACAFF	ACHNANTHES AFFINIS	10	3	4	5		P
1ACHAR	ACHNANTHES HAUCKIANA VAR. ROSTRATA	11	13	12	13	2	8
1ACLAD	ACHNANTHES LANCEOLATA VAR. DUBIA	P	3		1		
1AMCOF	AMPHORA COFFEIFORMIS				P		
1COCPE	COCCONEIS PEDICULUS			1			
1COCPL	COCCONEIS PLACENTULA	1	3	P	3		1
1CYCME	CYCLOTELLA MENEGHINIANA					P	
1CYMAF	CYMBELLA AFFINIS		P	P			
1CYMCI	CYMBELLA CISTULA		1		P		
1CYMMI	CYMBELLA MINUTA		P	P	1		P
1CYMMS	CYMBELLA MINUTA VAR. SILESIACA	3			1	P	
1DITEE	DIATOMA TENUE VAR. ELONGATUM			1			
1DIVUL	DIATOMA VULGARE	P				1	
1FRACR	FRAGILARIA CROTONENSIS		P			P	
1GOGRA	GOMPHONEMA GRACILE		P				
1GOOLI	GOMPHONEMA OLIVACEUM		1				
1GYSPE	GYROSIGMA SPENCERII	P					1
1NACPV	NAVICULA CRYPTOCEPHALA VAR. VENETA	P	P	1	2	1	1
1NAELG	NAVICULA ELGINENSIS						P
1NAHEU	NAVICULA HEUFLERI				P	P	P

1NANOT	NAVICULA NOTHA					P	P
1NARAD	NAVICULA RADIOSA	P					
1NASAI	NAVICULA SALINARUM VAR. INTERMEDIA						P
1NATSC	NAVICULA TRIPUNCTATA VAR. SCHIZONEMOIDES				P		
1NAVIR	NAVICULA VIRIDULA		P		P		P
1NAVIA	NAVICULA VIRIDULA VAR. AVENACEA	1					
1NIACI	NITZSCHIA ACICULARIS						P
1NIFRU	NITZSCHIA FRUSTULUM	11	23	42	20	32	36
1NIHOL	NITZSCHIA HOLSATICA		P	P		3	
1NIHUN	NITZSCHIA HUNGARICA						2
1NIIGN	NITZSCHIA IGNOPATA				1		
1NILAT	NITZSCHIA LATENS						P
1NILIN	NITZSCHIA LINEARIS		1		P		
1NIPAL	NITZSCHIA PALEA		P	P		1	
1NIROM	NITZSCHIA ROMANA		P	P			
1NITRL	NITZSCHIA TRYBLIONELLA VAR. LEVIDENSIS	1					
1PIMAI	PINNULARIA MAIOR						P
1PLDEL	PLEUROSIGMA DELICATISSIMA	P			1		1
1RHCUR	RHOICOSPHENIA CURVATA	1	2	1	P	P	5
1RHGIV	RHOPALODIA GIBBA	4	2	P	1	3	5
1RHMUS	RHOPALODIA MUSCULUS	P	P	4	2	P	P
1SUOVL	SURIRELLA OVALIS		P			1	P
1SYACU	SYNEDRA ACUS		P				
1SYFAS	SYNEDRA FASCICULATA			2	1	2	P
1SYMIN	SYNEDRA MINUSCULA			P			
1SYULD	SYNEDRA ULNA VAR. OXYRHYNCHUS	2					
1THSPP	THALASSIOSIRA FLUVIATILIS		P				
2CHAPR	AULBOCHAETA SP.	107	119	116	100	100	108
2DRAPA	DRAPARNALDIA SP.				P		
2SCEQU	SCENEDESMUS QUADRICAUDA	P					
4ANASP	ANABAENA SP.			8			
4CALSP	CALOTHRIX SP.	P			P		

P = PRESENT IN SAMPLE BUT NOT OBSERVED ON TRANSECT

STATION - YC-3 YELLOW CREEK
SAMPLE DATE - 100881
ANALYST - RD

NUMBER OF REPLICATES - 6
AREA SCRAPED - 5000 MM2
SUBSAMPLE VOLUME - 10 ML

VARIABLE PARAMETERS	REP1	REP2	REP3	REP4	REP5	REP6
AREA OF TRANSECT (MM2)	.0324	.0324	.0324	.0324	.0324	.0324
NUMBER OF TRANSECTS	6	7	12	5	11	9
NUMBER OF DROPS	10	6	8	6	10	4
COVERSLIP AREA (MM2)	625	625	625	625	625	625
DROPS/ML	50	50	50	50	50	50
ORIGINAL VOLUME (ML)	100	100	100	100	100	100
CONCENTRATE VOLUME (ML)	1.0	1.0	1.0	1.0	1.0	1.0

CODE	TAXON	NUMBER OBSERVED REP1	REP2	REP3	REP4	REP5	REP6
1ACAFF	ACHNANTHES AFFINIS		13	33	16	P	6
1AMOVP	AMPHORA OVALIS	5					
1CYCME	CYCLOTELLA MENEGHINIANA			1	3	1	5

1CYMAF	CYMBELLA AFFINIS				1		
1CYMCI	CYMBELLA CISTULA			2	3	1	
1CYMMI	CYMBELLA MINUTA	2	1	1	1	P	
1CYMMS	CYMBELLA MINUTA VAR. SILESIACA				1		
1GODIC	GOMPHONEMA DICHOTOMUM					1	
1HANAM	HANTZSCHIA AMPHIOXYS						1
1NACRY	NAVICULA CRYPTOCEPHALA	2					
1NACRV	NAVICULA CRYPTOCEPHALA VAR. VENETA					1	
1NAHEU	NAVICULA HEUFLERI					3	
1NALUZ	NAVICULA LUZONENSIS		1				
1NANOT	NAVICULA NOTHA	1			1	2	
1NAVIR	NAVICULA VIRIDULA	2	1	2	1		15
1NASPP	NAVICULA SP.			2		1	
1NIFRU	NITZSCHIA FRUSTULUM	22		13	3	36	29
1NILAT	NITZSCHIA LATENS		1		4		3
1NILIN	NITZSCHIA LINEARIS	4		6	8	3	
1NIPAL	NITZSCHIA PALEA	1	4				
1NIROM	NITZSCHIA ROMANA		3			2	
1NISIE	NITZSCHIA SIGMOIDEA		1	3	2	1	
1NITRL	NITZSCHIA TRYBLIONELLA VAR. LEVIDENSIS	1					
1PIBRE	PINNULARIA BREBISSONII				1	4	
1PLDEL	PLEUROSIGMA DELICATISSIMA	2	1	1			1
1RHGIV	RHOPALODIA GIBBA		2	2		2	5
1RHMUS	RHOPALODIA MUSCULUS	39	10	4	37	22	13
1STASP	STAURONIS SP.			1			
1SUOVL	SURIRELLA OVALIS					P	
1SYFAS	SYNEDRA FASCICULATA	2		1		P	
1SYPUL	SYNEDRA PULCHELLA VAR. LANCEOLATA		31	20	7	P	18
1UNPEN	UNIDENTIFIED PENNATE DIATOMS						6
2CHAPR	BULBOCHAETA SP.	100	107	104	100	102	105
4OSSPP	OSCILLATORIA SP.	1					

P = PRESENT IN SAMPLE BUT NOT OBSERVED ON TRANSECT

STATION - WR-1 WHITE RIVER
SAMPLE DATE - 100PR1
ANALYST - PD

NUMBER OF REPLICATES - 6
AREA SCRAPED - 5000 M2
SUBSAMPLE VOLUME - 10 ML

VARIABLE PARAMETERS	REP1	REP2	REP3	REP4	REP5	REP6
AREA OF TRANSECT (MM2)	.0324	.0324	.0324	.0324	.0324	.0324
NUMBER OF TRANSECTS	7	11	7	6	5	9
NUMBER OF DROPS	5	9	7	6	10	8
COVERSLIP AREA (MM2)	625	625	625	625	625	625
DROPS/ML	50	50	50	50	50	50
ORIGINAL VOLUME (ML)	220	220	220	220	220	220
CONCENTRATE VOLUME (ML)	1.0	1.0	1.0	1.0	1.0	1.0

CODE	TAXON	NUMBER OBSERVED REP1	REP2	REP3	REP4	REP5	REP6
1ACMIN	ACHNANTHES MINUTISSIMA	6		6	9		2
1AMPEL	AMPHIPLEURA PELLUCIDA	P			1		
1AMPER	AMPHORA PERPUSILLA	6				P	4
1CAAMP	CALONEIS AMPHISBAENA						1

1COCPE	COCCONEIS PEDICULUS	4	40	63	33	52	32
1COCPL	COCCONEIS PLACENTULA	3	2	11	8	2	
1CYCME	CYCLOTELLA MENEGHINIANA	3			6		
1CYMAF	CYMBELLA AFFINIS		P				
1CYMMS	CYMBELLA MINUTA VAR. SILESIACA	1	1		P	1	2
1DEELE	DENTICULA ELEGANS		P				
1DIVUL	DIATOMA VULGARE	1	3	P	5	1	2
1EPSOR	EPITHEMIA SOREX	23	54	38	20	26	13
1FRAPI	FRAGILARIA PINNATA		1				
1FRAVA	FRAGILARIA VAUCHERIAE				P		
1FRURH	FRUSTULIA RHOMBOIDES			1			
1GOANG	GOMPHONEMA ANGUSTATUM	1					
1GODIC	GOMPHONEMA DICHOTOMUM		P		1	2	P
1GOINT	GOMPHONEMA INTRICATUM		P				
1GOOL1	GOMPHONEMA OLIVACEUM	P	4	1	4		7
1GYSPE	GYROSIGMA SPENCERII	P		2			1
1HANAM	HANTZSCHIA AMPHIOXYS		1				
1NACIN	NAVICULA CINCTA			1		P	1
1NACIR	NAVICULA CINCTA VAR. ROSTRATA	P					
1NACRY	NAVICULA CRYPTOCEPHALA		1				
1NACRV	NAVICULA CRYPTOCEPHALA VAR. VENETA	P		1	1	3	
1NAGAS	NAVICULA GASTRUM	1					
1NAHEU	NAVICULA HEUFLERI	P	2	1	4		P
1NAMIN	NAVICULA MINIMA					P	
1NANOT	NAVICULA NOTHA	P	4	5	3	1	P
1NAPYG	NAVICULA PYGMAEA		1				
1NARAD	NAVICULA RADIOSA		1				
1NARHY	NAVICULA RHYNCHOCEPHALA	P	2	7	2	1	2
1NASAI	NAVICULA SALINARUM VAR. INTERMEDIA	P					
1NASEA	NAVICULA SECRETA VAR. APICULATA		P		P	1	
1NATSC	NAVICULA TRIPUNCTATA VAR. SCHIZONEMOIDES	P	1	7	1	P	P
1NAVIA	NAVICULA VIRIDULA VAR. AVENACEA	2	6	8	1	5	4
1NAVIL	NAVICULA VIRIDULA VAR. LINEARIS	1			P		
1NIACI	NITZSCHIA ACICULARIS				3		
1NIDEN	NITZSCHIA DENTICULA	P	P		2		
1NIDIS	NITZSCHIA DISSIPATA		1				
1NIFFU	NITZSCHIA FRUSTULUM	P	28	9	5	2	10
1NIGRA	NITZSCHIA GRACILIS	P			P		
1NIHUN	NITZSCHIA HUNGARICA	1					
1NILAT	NITZSCHIA LATENS		3				
1NILIN	NITZSCHIA LINEARIS	5		2			
1NIPAL	NITZSCHIA PALEA	1		1	2	P	7
1NISIE	NITZSCHIA SIGMOIDEA			1	2	P	
1NITRL	NITZSCHIA TRYBLIONELLA VAR. LEVIDENSIS					P	
1NISPP	NITZSCHIA SP.	P				P	6
1RHCUR	RHOICOSPHENIA CURVATA	14	6	5	5		10
1RHGIV	RHOPALODIA GIBBA		P			1	
1RHGIB	RHOPALODIA GIBBERULA	P					
1STASP	STAURONLS SP.		1				
1SULIN	SURIRELLA LINEARIS					1	
1SUOVA	SURIRELLA OVATA		P				
1SYFAS	SYNEDRA FASCICULATA					P	
1SYULN	SYNEDRA ULNA	P		1	3	P	3
1THSPP	THALASSIOSIRA FLUVIATILIS			1			
2CLASP	CLADOPHORA SP.	5	105	103	100	108	100
2SCEQU	SCENEDESMUS QUADRICAUDA	P					
4ANASP	ANABAENA SP.	P				P	P
4LYNSP	LYNGBYA SP.	P					
4OSSPP	OSCILLATORIA SP.	P				1	P
4PHSPP	PHORMIDIUM SP.	103	P	P	15	7	10

P = PRESENT IN SAMPLE BUT NOT OBSERVED ON TRANSECT

APPENDIX 4-2.4

Periphyton Density and Species Diversity
Calculations for all Stations by
Sampling Date for 1981

PERIPHYTON DENSITY AND SPECIES DIVERSITY ESTIMATES

RIO BLANCO OIL SHALE COMPANY
TRACT C-A

STATION NUMBER - CG-I
NUMBER OF REPITITIONS - 6
DATE - 042881

TAXON	DENSITY (UNITS/MM2) REP 1	REP 2	REP 3	REP 4	REP 5	REP 6	MEAN	S.D.
BACILLARIOPHYTA								
ACHNANTHES AFFINIS	65.8	.0	.0	.0	.0	.0	11.0	26.8
ACHNANTHES LANCEOLATA	109.6	.0	493.0	21.4	13.3	24.1	110.2	191.5
ACHNANTHES MINUTISSIMA	.0	.0	171.5	.0	124.2	150.7	74.4	82.9
AMPHORA VENETA	14.6	.0	.0	.0	.0	.0	2.4	6.0
CYMBELLA CISTULA	.0	.0	.0	7.1	.0	.0	1.2	2.9
CYMBELLA CYMBIFORMIS	14.6	.0	.0	.0	.0	.0	2.4	6.0
CYMBELLA MINUTA	14.6	.0	.0	.0	.0	.0	2.4	6.0
CYMBELLA MINUTA VAR. SILESIACA	.0	7.0	.0	7.1	4.4	.0	3.1	3.9
CYMBELLA SINUATA	29.2	.0	.0	.0	.0	.0	4.9	11.9
DIATOMA TENUE VAR. ELONGATUM	.0	.0	.0	14.3	.0	.0	2.4	5.8
EPITHEMIA SOREX	.0	.0	.0	.0	4.4	.0	.7	1.8
FRAGILARIA VAUCHERIAE	29.2	181.7	493.0	214.3	204.0	84.4	201.1	160.6
GOMPHONEMA OLIVACEUM	.0	7.0	107.2	.0	.0	18.1	22.0	42.3
MERIDION CIRCULARE	.0	.0	.0	.0	4.4	.0	.7	1.8
NAVICULA CRYPTOCEPHALA VAR. VENETA	.0	.0	21.4	.0	.0	24.1	7.6	11.8
NAVICULA PELLICULOSA	7.3	.0	.0	.0	.0	.0	1.2	3.0
NAVICULA SECRETA VAR. APICULATA	65.8	62.9	85.7	42.9	8.9	174.8	73.5	56.0
NAVICULA VIRIDULA	14.6	7.0	.0	.0	4.4	60.3	14.4	23.1
NITZSCHIA ACICULARIS	.0	21.0	.0	.0	.0	.0	3.5	8.6
NITZSCHIA FRUSTULUM	7.3	.0	.0	.0	.0	.0	1.2	3.0
NITZSCHIA HOLSATICA	.0	104.8	.0	71.4	57.8	271.3	84.2	100.9
NITZSCHIA LATENS	14.6	.0	.0	.0	.0	48.2	10.5	19.4
NITZSCHIA LINEARIS	43.8	21.0	.0	7.1	8.9	42.2	20.5	18.7
NITZSCHIA PALEA	.0	.0	.0	21.4	.0	.0	3.6	8.8
PINNULARIA SP.	7.3	.0	.0	.0	4.4	.0	2.0	3.2
SYNEDRA ACUS	.0	.0	21.4	.0	8.9	.0	5.1	8.8
SYNEDRA FASCICULATA	.0	.0	.0	.0	22.2	48.2	11.7	20.0
SYNEDRA MINUSCULA	.0	.0	.0	.0	8.9	.0	1.5	3.6
SYNEDRA ULNA	.0	14.0	.0	7.1	8.9	.0	5.0	5.9
DIVISION TOTAL	438.4	426.3	1393.2	414.4	487.8	946.4	684.4	402.4
CHLOROPHYTA								
SPIROGYRA SP.	.0	55.9	.0	.0	.0	.0	9.3	22.8
DIVISION TOTAL	.0	55.9	.0	.0	.0	.0	9.3	22.8
RHODOPHYTA								

BATRACHOSPERMUM SP.	730.7	747.8	2186.2	714.4	443.5	602.8	904.2	638.3
DIVISION TOTAL	730.7	747.8	2186.2	714.4	443.5	602.8	904.2	638.3
TOTAL DENSITY	1169.1	1230.1	3579.4	1128.8	931.2	1549.2	1598.0	991.2

DIVERSITY INDEX CALCULATIONS

SHANNON INDEX = 1.693
VARIANCE = .0014
MAXIMUM INDEX = 3.434
EVENNESS = .493
NO OF SPECIES = 31

STATION NUMBER - YC-1
NUMBER OF REPITITIONS - 6
DATE - 042881

TAXON	DENSITY (UNITS/MM2) REP 1	REP 2	REP 3	REP 4	REP 5	REP 6	MEAN	S.D.
BACILLARIOPHYTA								
ACHNANTHES AFFINIS	10046.9	1704.0	17361.1	3922.3	2507.7	6148.7	6948.5	5916.9
ACHNANTHES LANCEOLATA	1908.9	32.2	1607.5	.0	120.6	60.3	621.6	886.5
ACHNANTHES MINUTISSIMA	1105.2	.0	.0	.0	.0	.0	184.2	451.2
AMPHORA OVALIS	100.5	.0	160.8	.0	.0	.0	43.5	70.1
COCCONEIS PEDICULUS	100.5	.0	.0	.0	.0	.0	16.7	41.0
COCCONEIS PLACENTULA	200.9	.0	482.3	.0	48.2	180.8	152.0	184.0
CYCLOTELLA MENEGHINIANA	4219.7	48.2	1446.8	32.2	241.1	1024.8	1168.8	1600.9
CYMBELLA AFFINIS	.0	.0	.0	.0	24.1	.0	4.0	9.8
CYMBELLA MINUTA	502.3	.0	482.3	32.2	24.1	120.6	193.6	235.1
CYMBELLA MINUTA VAR. SILESIACA	.0	96.5	.0	.0	72.3	.0	28.1	44.2
DENTICULA ELEGANS	.0	.0	.0	32.2	.0	.0	5.4	13.1
DIATOMA TENUE VAR. ELONGATUM	602.8	.0	1929.0	.0	48.2	.0	426.0	771.7
FRAGILARIA VAUCHERIAE	5023.5	80.4	1607.5	32.2	217.0	542.5	1250.5	1936.3
GOMPHONEMA ANGUSTATUM	.0	16.1	.0	32.2	.0	60.3	18.1	24.3
GOMPHONEMA INTRICATUM	200.9	.0	160.8	.0	.0	.0	60.3	94.2
GOMPHONEMA PARVULUM	.0	.0	.0	32.2	.0	.0	5.4	13.1
NAVICULA ARVENSIS	.0	.0	.0	32.2	.0	60.3	15.4	25.5
NAVICULA CRYPTOCEPHALA VAR. VENETA	200.9	16.1	.0	225.1	48.2	.0	81.7	103.5
NAVICULA ELGINENSIS	.0	16.1	160.8	96.5	24.1	.0	49.6	65.2
NAVICULA HEUFLERI	.0	16.1	.0	.0	24.1	.0	6.7	10.7
NAVICULA LANCEOLATA	.0	16.1	.0	.0	.0	.0	2.7	6.6
NAVICULA NOTHA	.0	16.1	.0	.0	.0	.0	2.7	6.6
NAVICULA SECRETA VAR. APICULATA	602.8	16.1	643.3	32.2	.0	120.6	235.8	303.7
NAVICULA VIRIDULA	.0	.0	160.8	.0	24.1	.0	30.6	64.4
NITZSCHIA APICULATA	100.5	.0	160.8	.0	.0	.0	43.5	70.1
NITZSCHIA DENTICULA	.0	.0	160.8	.0	.0	.0	26.8	65.6
NITZSCHIA FRUSTULUM	1607.5	16.1	.0	.0	.0	.0	270.6	655.0
NITZSCHIA LINEARIS	100.5	.0	160.8	.0	.0	120.6	63.4	72.4
NITZSCHIA PALEA	.0	.0	160.8	.0	.0	.0	26.8	65.6

RHOPALODIA MUSCULUS	100.5	.0	.0	.0	.0	.0	16.7	41.0
SYNEDRA FASCICULATA	100.5	.0	160.8	.0	120.6	180.8	93.8	76.0
SYNEDRA MINUSCULA	100.5	.0	1286.0	32.2	.0	.0	236.4	515.7
SYNEDRA ULNA	301.4	48.2	321.5	96.5	.0	120.6	148.0	133.3
DIVISION TOTAL	27227.2	2138.0	28613.7	4629.6	3544.6	8740.8	12482.3	12167.0
CHLOROPHYTA								
ENTEROMORPHA SP.	4018.8	482.3	6430.0	160.8	.0	3737.5	2471.5	2646.5
DIVISION TOTAL	4018.8	482.3	6430.0	160.8	.0	3737.5	2471.5	2646.5
TOTAL DENSITY	31246.0	2620.2	35043.7	4790.4	3544.6	12476.3	14953.9	14565.4

DIVERSITY INDEX CALCULATIONS

SHANNON INDEX = 1.952
VARIANCE = .0001
MAXIMUM INDEX = 3.526
EVENNESS = .553
NO OF SPECIES = 34

STATION NUMBER - YC-2
NUMBER OF REPITITIONS - 6
DATE - 042681

TAXON	DENSITY (UNITS/MM2) REP 1	REP 2	REP 3	REP 4	REP 5	REP 6	MEAN	S.D.
BACILLARIOPHYTA								
ACHNANTHES AFFINIS	.0	.0	128.6	.0	.0	.0	21.4	52.5
ACHNANTHES HAUCKIANA	.0	120.6	.0	.0	.0	.0	20.1	49.2
ACHNATHES HAUCKIANA VAR. ROSTRATA	.0	.0	.0	.0	.0	38.6	6.4	15.8
ACHNANTHES LANCEOLATA	.0	60.3	.0	.0	.0	.0	10.0	24.6
ACHNANTHES MICROCEPHALA	38.6	.0	.0	.0	.0	.0	6.4	15.8
ACHNANTHES MINUTISSIMA	77.2	1446.8	.0	144.7	241.1	.0	318.3	560.4
CALONEIS VENTRICOSA	.0	.0	.0	.0	48.2	.0	8.0	19.7
CYMBELLA MINUTA VAR. SILESIACA	.0	.0	.0	.0	.0	38.6	6.4	15.8
ENTOMONEIS PALUDOSA	.0	.0	.0	.0	96.5	.0	16.1	39.4
FRAGILARIA CAPUCINA	.0	.0	321.5	96.5	337.6	38.6	132.4	156.9
NAVICULA ARVENSIS	.0	.0	64.3	.0	.0	77.2	23.6	31.6
NAVICULA CRYPTOCEPHALA VAR. VENETA	.0	.0	64.3	.0	.0	.0	10.7	26.2

NAVICULA HALOPHILA	.0	241.1	.0	241.1	.0	.0	80.4	124.5
NAVICULA RADIOSA VAR. PARVA	.0	60.3	.0	.0	.0	.0	10.0	24.6
NAVICULA SECRETA VAR. APICULATA	38.6	.0	.0	.0	.0	.0	6.4	15.8
NITZSCHIA FRUSTULUM	.0	482.3	321.5	48.2	1157.4	38.6	341.3	442.8
NITZSCHIA HOLSATICA	424.4	843.9	64.3	578.7	434.0	308.6	442.3	261.2
RHOPALODIA GIBBA	848.8	602.8	128.6	337.6	723.4	617.3	543.1	264.2
RHOPALODIA MUSCULUS	192.9	180.8	192.9	.0	482.3	77.2	187.7	163.9
SYNEDRA MINUSCULA	.0	60.3	.0	.0	144.7	.0	34.2	59.3
SYNEDRA PULCHELLA VAR. LANCEOLATA	.0	180.8	.0	.0	.0	.0	30.1	73.8
DIVISION TOTAL	1620.4	4280.0	1286.0	1446.8	3665.1	1234.6	2255.5	1350.9
CHLOROPHYTA								
BULBOCHAETA SP.	3658.0	6510.4	6430.0	4822.5	5690.6	4321.0	5272.1	1109.6
DIVISION TOTAL	3658.0	6510.4	6430.0	4822.5	5690.6	4321.0	5272.1	1109.6
CYANOPHYTA								
ANABAENA SP.	501.5	1507.0	321.5	.0	.0	.0	388.3	586.7
PHORMIDIUM SP.	154.3	.0	.0	.0	.0	.0	25.7	63.0
DIVISION TOTAL	655.9	1507.0	321.5	.0	.0	.0	414.1	596.0
TOTAL DENSITY	6134.3	12297.5	8037.6	6269.3	9355.7	5555.6	7941.6	2558.9

DIVERSITY INDEX CALCULATIONS

SHANNON INDEX = 1.411
VARIANCE = .0003
MAXIMUM INDEX = 3.178
EVENNESS = .444
NO OF SPECIES = 24

STATION NUMBER - YC-3
NUMBER OF REPITITIONS - 6
DATE - 042981

TAXON	DENSITY (UNITS/MM2) REP 1	REP 2	REP 3	REP 4	REP 5	REP 6	MEAN	S.D.
BACILLARIOPHYTA								
ACHNANTHES AFFINIS	2142.3	2941.7	1800.4	2700.6	2797.1	2145.3	2338.1	451.4

CYCLOTELLA MENEGHINIANA	107.2	48.2	96.5	217.0	48.2	24.1	90.2	69.7
CYMBELLA MINUTA	.0	24.1	16.1	.0	.0	.0	6.7	10.7
CYMBELLA MINUTA VAR. SILESIACA	64.3	120.6	128.6	144.7	964.5	385.8	301.4	343.6
ENTOMONEIS PALUDOSA	21.4	.0	.0	.0	.0	.0	3.6	8.8
FRAGILARIA VAUCHERIAE	.0	.0	.0	.0	48.2	.0	8.0	19.7
GOMPHONEMA ANGUSTATUM	.0	24.1	.0	.0	.0	.0	4.0	9.8
NAVICULA CRYPTOCEPHALA VAR. VENETA	.0	.0	.0	.0	.0	72.3	12.1	29.5
NAVICULA HALOPHILA	21.4	.0	.0	.0	24.1	72.3	19.6	28.1
NAVICULA MENISCULUS VAR. UPSALIENSIS	.0	.0	.0	.0	24.1	.0	4.0	9.8
NAVICULA NOTHA	64.3	.0	.0	.0	.0	.0	10.7	26.3
NITZSCHIA APICULATA	.0	24.1	.0	.0	.0	.0	4.0	9.8
NITZSCHIA FRUSTULUM	42.9	.0	.0	.0	.0	241.1	47.3	96.5
NITZSCHIA HOLSATICA	.0	.0	176.8	.0	.0	.0	29.5	72.2
NITZSCHIA HUNGARICA	21.4	.0	.0	.0	.0	.0	3.6	8.8
NITZSCHIA ROMANA	21.4	.0	.0	.0	.0	.0	3.6	8.8
NITZSCHIA TRYBLIONELLA VAR. LEVIDENS	.0	.0	16.1	.0	.0	.0	2.7	6.6
SURIRELLA OVALIS	21.4	24.1	16.1	24.1	.0	.0	14.3	11.5
SURIRELLA OVATA	321.5	144.7	176.8	168.8	289.4	168.8	211.7	74.1
SYNEDRA PULCHELLA VAR. LANCEOLATA	42.9	.0	.0	24.1	771.6	48.2	147.8	306.3
DIVISION TOTAL	2893.5	3351.7	2427.3	3279.3	4967.2	3858.0	3462.8	878.8
CHLOROPHYTA								
BULBOCHAETA SP.	2229.1	1036.8	160.8	2580.1	1229.7	1567.3	1467.3	869.2
DIVISION TOTAL	2229.1	1036.8	160.8	2580.1	1229.7	1567.3	1467.3	869.2
TOTAL DENSITY	5122.6	4388.5	2588.1	5859.4	6197.0	5425.3	4930.1	1306.1

DIVERSITY INDEX CALCULATIONS

SHANNON INDEX = 1.386
VARIANCE = .0003
MAXIMUM INDEX = 3.045
EVENNESS = .455
NO OF SPECIES = 21

STATION NUMBER - WR-1
NUMBER OF REPITITIONS - 6
DATE - 042981

TAXON	DENSITY (UNITS/MM2) REP 1	REP 2	REP 3	REP 4	REP 5	REP 6	MEAN	S.D.

BACILLARIOPHYTA								
ACHNANTHES EXIGUA	.0	.0	.0	.0	.0	29.7	4.9	12.1
ACHNANTHES MINUTISSIMA	183.7	22.7	.0	884.1	455.9	415.5	227.0	333.1
AMPHORA PERPUSILLA	.0	136.2	.0	.0	140.3	385.8	116.4	151.0
COCCONEIS PEDICULUS	91.9	22.7	.0	.0	35.1	178.1	54.6	69.3
COCCONEIS PLACENTULA	36.7	45.4	275.6	160.8	35.1	59.4	102.1	97.3
CYMBELLA MINUTA	.0	22.7	.0	.0	.0	.0	3.8	9.3
CYMBELLA MINUTA VAR. SILESIACA	73.5	68.1	716.5	160.8	35.1	207.7	210.3	256.3
CYMBELLA SINUATA	.0	22.7	165.3	.0	35.1	59.4	47.1	62.1
DIATOMA VULGARE	275.6	181.6	110.2	241.1	210.4	178.1	199.5	57.3
EPITHEMIA SOREX	606.3	2110.6	551.1	1044.9	526.1	356.1	865.8	651.6
EPITHEMIA TURGIDA	18.4	22.7	.0	.0	.0	.0	6.8	10.7
FRAGILARIA VAUCHERIAE	.0	45.4	.0	.0	.0	207.7	42.2	83.1
GOMPHONEIS HERCULEANA	.0	.0	.0	.0	35.1	.0	5.8	14.3
GOMPHONEMA ANGUSTATUM	.0	.0	110.2	.0	.0	.0	18.4	45.0
GOMPHONEMA OLIVACEUM	18.4	226.9	55.1	562.6	210.4	207.7	213.5	192.5
GOMPHONEMA PARVULUM	91.9	.0	.0	.0	.0	.0	15.3	37.5
GYROSIGMA SPENCERII	.0	22.7	.0	80.4	70.1	29.7	33.8	34.4
HANNAEA ARCUS	18.4	22.7	.0	.0	.0	29.7	11.8	13.4
NAVICULA CRYPTOCEPHALA	.0	.0	.0	.0	35.1	59.4	15.7	25.6
NAVICULA CRYPTOCEPHALA VAR. VENETA	.0	113.5	55.1	.0	35.1	.0	33.6	45.2
NAVICULA EXIGUA	.0	.0	.0	.0	.0	29.7	4.9	12.1
NAVICULA HEUFLERI	73.5	.0	.0	.0	.0	29.7	17.2	30.0
NAVICULA LANCEOLATA	91.9	22.7	55.1	.0	.0	.0	28.3	37.9
NAVICULA MINIMA	55.1	.0	.0	.0	.0	.0	9.2	22.5
NAVICULA NOTHA	91.9	453.9	496.0	241.1	245.5	89.0	269.6	173.7
NAVICULA RHYNCHOCEPHALA	.0	22.7	55.1	.0	35.1	29.7	23.8	21.3
NAVICULA SECRETA VAR. APICULATA	55.1	22.7	.0	160.8	70.1	59.4	61.3	55.2
NAVICULA TRIPUNCTATA	55.1	226.9	.0	241.1	70.1	29.7	103.6	103.7
NAVICULA VIRIDULA	1322.8	2314.8	3637.6	3536.5	3752.8	2997.4	2927.0	949.9
NITZSCHIA DISSIPATA	91.9	204.2	.0	.0	70.1	59.4	70.9	75.4
NITZSCHIA FRUSTULUM	.0	204.2	330.7	.0	210.4	385.8	188.5	161.8
NITZSCHIA PALEA	.0	113.5	.0	80.4	140.3	89.0	70.5	58.5
NITZSCHIA SIGMOIDEA	.0	.0	.0	.0	35.1	.0	5.8	14.3
NITZSCHIA SP.	.0	295.0	.0	.0	.0	.0	49.2	120.4
RHOICOSPHENIA CURVATA	1873.9	907.8	3582.5	3295.4	3121.5	1216.8	2333.0	1148.7
SURIRELLA OVATA	.0	.0	.0	.0	70.1	.0	11.7	28.6
SYNEDRA ULNA	.0	.0	.0	80.4	.0	29.7	18.3	32.6
UNIDENTIFIED PENNATE DIATOMS	.0	.0	.0	.0	105.2	.0	17.5	43.0
DIVISION TOTAL	5125.7	7874.9	10196.2	10770.3	9785.4	7449.0	8533.6	2124.1
CHLOROPHYTA								
CLADOPHORA SP.	1598.3	1270.9	5511.5	8439.4	2385.0	1187.1	3398.7	2951.6
DIVISION TOTAL	1598.3	1270.9	5511.5	8439.4	2385.0	1187.1	3398.7	2951.6
CYANOPHYTA								
PHORMIDIUM SP.	.0	113.5	.0	.0	.0	.0	18.9	46.3
DIVISION TOTAL	.0	113.5	.0	.0	.0	.0	18.9	46.3
RHODOPHYTA								

AUDOUINELLA VIOLACEA	.0	.0	.0	562.6	.0	.0	93.8	229.7
DIVISION TOTAL	.0	.0	.0	562.6	.0	.0	93.8	229.7
TOTAL DENSITY	6724.0	9259.3	15707.7	19772.4	12170.3	8636.0	12044.9	4916.1

DIVERSITY INDEX CALCULATIONS

SHANNON INDEX = 2.169
VARIANCE = .0002
MAXIMUM INDEX = 3.714
EVENNESS = .584
NO OF SPECIES = 41

STATION NUMBER - WR-2
NUMBER OF REPITITIONS - 6
DATE - 042981

TAXON	DENSITY (UNITS/MM2) REP 1	REP 2	REP 3	REP 4	REP 5	REP 6	MEAN	S.D.
BACILLARIOPHYTA								
ACHNANTHES AFFINIS	4409.2	.0	.0	.0	.0	.0	734.9	1800.0
ACHNANTHES EXIGUA	.0	.0	.0	.0	27.6	.0	4.6	11.3
ACHNANTHES LANCEOLATA	137.8	.0	.0	.0	.0	.0	23.0	56.3
ACHNANTHES MINUTISSIMA	14329.8	6613.8	6028.2	6684.9	1818.8	5690.6	6859.3	4083.3
AMPHORA OVALIS	.0	.0	.0	.0	55.1	.0	9.2	22.5
AMPHORA PERPUSILLA	551.1	110.2	.0	55.1	82.7	.0	133.2	209.4
COCCONEIS PEDICULUS	.0	55.1	.0	.0	55.1	.0	18.4	28.5
COCCONEIS PLACENTULA	413.4	.0	144.7	.0	55.1	.0	102.2	162.6
CYMBELLA AFFINIS	.0	55.1	.0	.0	.0	.0	9.2	22.5
CYMBELLA MINUTA VAR. SILESIACA	1377.9	661.4	1012.7	606.3	385.8	289.4	722.2	407.9
CYMBELLA SINUATA	.0	.0	.0	.0	27.6	.0	4.6	11.3
DIATOMA VULGARE	137.8	110.2	48.2	.0	.0	144.7	73.5	66.3
EPITHEMIA SOREX	2755.7	606.3	289.4	440.9	192.9	337.6	770.5	982.8
FRAGILARIA LEPTOSTAURON	.0	.0	.0	.0	.0	48.2	8.0	19.7
FRAGILARIA VAUCHERIAE	.0	.0	.0	.0	27.6	.0	4.6	11.3
GOMPHONEMA ANGUSTATUM	688.9	110.2	144.7	55.1	27.6	.0	171.1	259.2
GOMPHONEMA OLIVACEUM	413.4	.0	.0	.0	137.8	.0	91.9	166.9
GOMPHONEMA PARVULUM	413.4	.0	.0	.0	.0	.0	68.9	168.8
GYROSIGMA SPENCERII	137.8	.0	.0	.0	82.7	.0	36.7	59.5
HANNAEA ARCUS	.0	55.1	.0	.0	27.6	.0	13.8	23.1
NAVICELLA CINCTA	275.6	.0	.0	.0	.0	.0	45.9	112.5
NAVICULA CRYPTOCEPHALA	.0	.0	.0	.0	.0	96.5	16.1	39.4
NAVICELLA CRYPTOCEPHALA VAR. VENETA	.0	55.1	.0	110.2	27.6	144.7	56.3	59.8
NAVICULA EXIGUA	137.8	.0	.0	.0	.0	.0	23.0	56.3
NAVICULA HALOPHILA	137.8	.0	.0	55.1	.0	.0	32.2	56.3
NAVICULA HEUFLERI	413.4	.0	.0	55.1	.0	.0	78.1	169.7
NAVICULA NOTHA	551.1	55.1	289.4	.0	165.3	.0	176.8	214.6
NAVICELLA RHYNCHOCEPHALA	.0	.0	.0	.0	27.6	.0	4.6	11.3
NAVICULA SECRETA VAR. APICULATA	.0	110.2	.0	.0	248.0	.0	59.7	102.2

NAVICULA TRIPUNCTATA	137.8	.0	48.2	55.1	.0	.0	40.2	54.1
NAVICULA VIRIDULA	4271.4	936.9	2604.2	1102.3	1791.2	1591.4	2049.6	1237.4
NITZSCHIA DISSIPATA	1791.2	.0	48.2	220.5	137.8	241.1	406.5	684.9
NITZSCHIA FRUSTULUM	1102.3	165.3	337.6	496.0	220.5	48.2	395.0	378.7
NITZSCHIA IGNORATA	413.4	.0	.0	55.1	.0	.0	78.1	165.7
NITZSCHIA PALEA	688.9	220.5	48.2	55.1	137.8	48.2	199.8	249.2
RHOICOSPHENIA CURVATA	413.4	165.3	241.1	551.1	82.7	192.9	274.4	174.5
SURIRELLA OVALIS	.0	.0	48.2	.0	.0	.0	6.0	19.7
SURIRELLA OVATA	.0	.0	48.2	.0	27.6	48.2	20.7	23.9
SYNEDRA PULCHELLA VAR. LANCEOLATA	137.8	.0	.0	55.1	.0	.0	32.2	56.3
SYNEDRA ULNA	.0	.0	.0	.0	82.7	.0	13.8	33.8
DIVISION TOTAL	36237.9	10086.0	11381.2	10637.1	5952.4	8921.7	13869.4	11171.7
CHLOROPHYTA								
CLADOPHORA SP.	.0	1212.5	3038.2	4739.9	2866.0	1109.2	2161.0	1708.4
DIVISION TOTAL	.0	1212.5	3038.2	4739.9	2866.0	1109.2	2161.0	1708.4
CYANOPHYTA								
PHORMIDIUM SP.	964.5	1212.5	.0	.0	330.7	289.4	466.2	507.9
DIVISION TOTAL	964.5	1212.5	.0	.0	330.7	289.4	466.2	507.9
RHODOPHYTA								
AUDOUINELLA VIOLACEA	.0	.0	.0	.0	303.1	.0	90.5	123.8
LEMANEA FUCINA	964.5	.0	.0	.0	.0	.0	180.8	393.8
DIVISION TOTAL	964.5	.0	.0	.0	303.1	.0	211.3	388.4
TOTAL DENSITY	38166.9	12511.0	14419.4	15377.0	9452.2	10320.2	16707.8	10756.9

DIVERSITY INDEX CALCULATIONS

SHANNON INDEX = 2.238
VARIANCE = .0001
MAXIMUM INDEX = 3.784
EVENNESS = .592
NO OF SPECIES = 44

PERIPHYTON DENSITY AND SPECIES DIVERSITY ESTIMATES

RIO BLANCO OIL SHALE COMPANY
TRACT C-A

STATION NUMBER - CG-1
NUMBER OF REPITITIONS - 6
DATE - 072081

TAXON	DENSITY (UNITS/MM2) REP 1	REP 2	REP 3	REP 4	REP 5	REP 6	MEAN	S.D.
BACILLARIOPHYTA								
ACHNANTHES AFFINIS	238.8	90.8	771.6	606.3	1330.4	827.9	644.3	445.6
ACHNANTHES LANCEOLATA VAR. DUBIA	55.1	34.0	217.0	18.4	13.3	.0	56.3	81.0
AMPHORA COFFEIFORMIS	.0	.0	.0	.0	26.6	.0	4.4	10.9
CYCLOTELLA MENEGHINIANA	.0	.0	.0	18.4	.0	.0	3.1	7.5
CYMBELLA MINUTA VAR. SILESIACA	.0	79.4	.0	27.6	.0	.0	17.8	32.1
FRAGILARIA VAUCHERIAE	18.4	11.3	12.1	9.2	.0	.0	8.5	7.3
GOMPHONEMA OLIVACEUM	55.1	.0	.0	.0	.0	.0	9.2	22.5
HANTZSCHIA AMPHIOXYS	55.1	.0	.0	9.2	.0	.0	10.7	22.1
MERIDION CIRCULARE	.0	56.7	.0	.0	.0	16.1	12.1	22.8
NAVICULA CRYPTOCEPHALA VAR. VENETA	36.7	.0	12.1	36.7	66.5	40.2	32.0	23.3
NAVICULA HALOPHILA	.0	11.3	.0	.0	.0	.0	1.9	4.6
NAVICULA HEUFLERI	18.4	.0	.0	.0	.0	.0	3.1	7.5
NAVICULA LUZONENSIS	18.4	.0	.0	.0	.0	.0	3.1	7.5
NAVICULA NOTHA	.0	.0	.0	.0	39.9	.0	6.7	16.3
NAVICULA PELLICULOSA	18.4	90.8	.0	.0	13.3	.0	20.4	35.4
NAVICULA SECRETA VAR. APICULATA	91.9	68.1	12.1	9.2	.0	.0	30.2	39.6
NAVICULA VIRIDULA	73.5	11.3	.0	.0	.0	.0	14.1	29.4
NAVICULA VIRIDULA VAR. AVENACEA	.0	.0	.0	9.2	.0	.0	1.5	3.8
NITZSCHIA ACICULARIS	36.7	.0	.0	.0	26.6	.0	10.6	16.7
NITZSCHIA DENTICULA	.0	.0	12.1	.0	.0	.0	2.0	4.9
NITZSCHIA DISSIPATA	128.6	.0	.0	.0	.0	32.2	26.8	51.5
NITZSCHIA FRUSTULUM	183.7	1134.7	1205.6	946.1	199.6	602.8	712.1	454.0
NITZSCHIA HOLSATICA	.0	11.3	.0	.0	13.3	.0	4.1	6.4
NITZSCHIA LATENS	.0	.0	.0	.0	13.3	.0	2.2	5.4
NITZSCHIA PALEA	55.1	11.3	.0	18.4	13.3	.0	16.4	20.4
PINNULARIA BREBISSONII	.0	11.3	.0	.0	.0	.0	1.9	4.6
RHOPALODIA MUSCULUS	165.3	.0	.0	.0	.0	.0	27.6	67.5
SURIRELLA OVATA	18.4	.0	.0	.0	.0	.0	3.1	7.5
SYNEDRA FASCICULATA	18.4	.0	.0	.0	.0	.0	3.1	7.5
SYNEDRA ULNA	.0	11.3	.0	.0	13.3	.0	4.1	6.4
DIVISION TOTAL	1286.0	1634.0	2242.5	1708.6	1769.4	1519.1	1693.2	318.5
TOTAL DENSITY	1286.0	1634.0	2242.5	1708.6	1769.4	1519.1	1693.2	318.5

DIVERSITY INDEX CALCULATIONS

SHANNON INDEX = 1.626
VARIANCE = .0013
MAXIMUM INDEX = 3.401
EVENNESS = .478
NO OF SPECIES = 30

STATION NUMBER - YC-I
NUMBER OF REPITITIONS - 6
DATE - 072081

TAXON	DENSITY (UNITS/MM2) REP 1	REP 2	REP 3	REP 4	REP 5	REP 6	MEAN	S.D.
BACILLARIOPHYTA								
ACHNANTHES AFFINIS	.0	121.8	36.2	33.1	41.3	364.7	119.4	142.0
ACHNANTHES LANCEOLATA	.0	.0	12.1	.0	.0	8.1	4.0	5.7
ACHNANTHES LANCEOLATA VAR. OUBIA	.0	335.0	132.6	33.1	51.6	.0	110.5	134.7
ACHNANTHES MINUTISSIMA	.0	111.7	120.6	27.6	92.8	24.3	75.4	46.3
AMPHORA OVALIS	.0	30.5	.0	5.5	.0	.0	7.2	13.2
COCCONEIS PLACENTULA	.0	10.2	.0	.0	.0	.0	2.0	4.5
CYCLOTELLA MENEGHINIANA	.0	50.8	24.1	.0	10.3	48.6	26.8	22.6
CYMBELLA MINUTA	.0	.0	.0	16.5	10.3	8.1	7.0	7.1
CYMBELLA MINUTA VAR. SILESIACA	.0	30.5	12.1	.0	10.3	.0	10.6	12.5
DIATOMA TENUE	.0	.0	12.1	.0	.0	.0	2.4	5.4
FRAGILARIA VAUCHERIAE	.0	.0	.0	.0	.0	8.1	1.6	3.6
GOMPHONEMA ANGUSTATUM	.0	.0	.0	.0	.0	8.1	1.6	3.6
NAVICULA ARVENSIS	.0	.0	.0	.0	.0	16.2	3.2	7.2
NAVICULA CRYPTOCEPHALA VAR. VENETA	.0	182.7	48.2	99.2	154.7	24.3	101.8	67.5
NAVICULA HEUFLERI	.0	60.9	.0	71.6	10.3	.0	28.6	34.9
NAVICULA LUZONENSIS	.0	.0	.0	.0	.0	8.1	1.6	3.6
NAVICULA MINIMA	.0	.0	.0	38.6	.0	.0	7.7	17.3
NAVICULA NOTHA	.0	60.9	.0	11.0	20.6	.0	18.5	25.2
NAVICULA PELLICULOSA	.0	162.4	84.4	93.7	309.5	24.3	134.9	109.2
NAVICULA SECRETA VAR. APICULATA	.0	203.1	24.1	110.2	82.5	48.6	93.7	69.3
NAVICULA VIRIDULA	.0	20.3	12.1	.0	.0	.0	6.5	9.3
NITZSCHIA ACICULARIS	.0	.0	.0	.0	10.3	.0	2.1	4.6
NITZSCHIA DENTICULA	.0	.0	.0	5.5	.0	.0	1.1	2.5
NITZSCHIA DISSIPATA	.0	.0	.0	.0	.0	8.1	1.6	3.6
NITZSCHIA FONTICOLA	.0	.0	.0	.0	10.3	.0	2.1	4.6
NITZSCHIA FRUSTULUM	.0	1015.3	1209.6	562.2	1031.6	810.5	929.0	246.5
NITZSCHIA PALEA	.0	10.2	24.1	5.5	.0	8.1	9.6	9.0
NITZSCHIA ROMANA	.0	10.2	.0	.0	.0	.0	2.0	4.5
RHOPALODIA MUSCULUS	.0	20.3	12.1	.0	.0	.0	6.5	9.3
SYNEDRA FASCICULATA	.0	.0	.0	.0	.0	8.1	1.6	3.6
SYNEDRA MINUSCULA	.0	.0	.0	5.5	20.6	.0	5.2	8.9
SYNEDRA ULNA	.0	.0	.0	5.5	10.3	.0	3.2	4.7
DIVISION TOTAL	.0	2430.6	1760.2	1124.3	1877.4	1428.5	1725.0	495.2

TOTAL DENSITY	.0	2436.6	1760.2	1124.3	1877.4	1426.5	1725.0	495.2

DIVERSITY INDEX CALCULATIONS

SHANNON INDEX = 1.843
VARIANCE = .0013
MAXIMUM INDEX = 3.466
EVENNESS = .532
NO OF SPECIES = 32

STATION NUMBER - YC-2
NUMBER OF REPITITIONS - 6
DATE - 072181

TAXON	DENSITY (UNITS/MM2) REP 1	REP 2	REP 3	REP 4	REP 5	REP 6	MEAN	S.D.
BACILLARIOPHYTA								
ACHNANTHES AFFINIS	2218.4	35.7	424.4	.0	.0	829.5	701.6	912.3
ACHNATHES HAUCKIANA VAR. ROSTRATA	.0	1214.6	.0	38.6	.0	.0	250.6	539.1
ACHNANTHES LANCEOLATA VAR. OUBIA	.0	35.7	.0	.0	.0	.0	7.1	16.0
AMPHORA COFFEIFORMIS	.0	.0	38.6	.0	.0	.0	7.7	17.3
COCCONEIS PEDICULUS	.0	.0	77.2	.0	.0	19.3	19.3	33.4
COCCONEIS PLACENTULA	.0	35.7	.0	.0	.0	.0	7.1	16.0
CYCLOTELLA MENEGHINIANA	96.5	35.7	154.3	.0	.0	.0	57.3	67.0
CYMBELLA MINUTA VAR. SILESIACA	.0	.0	38.6	.0	.0	.0	7.7	17.3
FRAGILARIA CAPUCINA	.0	.0	.0	.0	.0	38.6	7.7	17.3
GOMPHONEMA ANGUSTATUM	.0	.0	38.6	.0	.0	.0	7.7	17.3
GOMPHONEMA INTRICATUM	48.2	.0	.0	.0	.0	.0	9.6	21.6
NAVICULA ARVENSIS	144.7	.0	.0	.0	.0	.0	28.9	64.7
NAVICLLA CRYPTOCEPHALA VAR. VENETA	48.2	.0	.0	.0	.0	.0	9.6	21.6
NITZSCHIA DENTICULA	.0	.0	38.6	.0	.0	.0	7.7	17.3
NITZSCHIA FRUSTULUM	5304.8	2822.1	3858.0	3125.0	.0	482.3	3118.4	1758.2
NITZSCHIA HOLSATICA	.0	.0	.0	115.7	.0	.0	23.1	51.6
NITZSCHIA IGNORATA	48.2	.0	.0	.0	.0	.0	9.6	21.6
NITZSCHIA LATENS	.0	71.4	.0	.0	.0	.0	14.3	32.0
NITZSCHIA PALEA	96.5	35.7	.0	38.6	.0	.0	34.2	39.5
PLEUROSIGMA DELICATISSIMA	.0	.0	38.6	.0	.0	.0	7.7	17.3
RHOICOSPHENIA CURVATA	48.2	35.7	.0	38.6	.0	.0	24.5	22.6
RHOPALODIA GIBBA	48.2	178.6	38.6	38.6	.0	.0	66.6	6[illegible].4
RHOPALODIA MUSCULUS	48.2	.0	.0	77.2	.0	.0	25.1	35.6
SYNEDRA FASCICULATA	144.7	71.4	.0	.0	.0	.0	43.2	64.6
SYNEDRA PULCHELLA VAR. LANCEOLATA	.0	71.4	.0	810.2	.0	.0	176.3	355.7
SYNEDRA ULNA	48.2	.0	.0	38.6	.0	.0	17.4	24.0
SYNEDRA ULNA VAR. CONSTRICTA	.0	.0	.0	.0	.0	19.3	3.2	7.8

DIVISION TOTAL	8343.0	4643.9	4745.4	4321.0	.0	1388.9	4686.4	2469.0
CHLOROPHYTA								
BULBOCHAETA SP.	.0	714.4	1697.5	3973.8	.0	1986.9	1674.5	1509.2
CLADOPHORA SP.	.0	571.6	.0	.0	.0	.0	114.3	255.6
SCENEDESMUS QUADRICAUDA	.0	.0	.0	.0	.0	19.3	3.9	8.6
STIGEOCLONIUM TENUE	2314.8	3608.0	.0	.0	.0	.0	1184.6	1685.2
DIVISION TOTAL	2314.8	4894.0	1697.5	3973.8	.0	2006.2	2977.3	1386.2
TOTAL DENSITY	10657.8	9537.9	6442.9	8294.8	.0	3395.1	7663.7	2854.3

DIVERSITY INDEX CALCULATIONS

SHANNON INDEX = 1.799
VARIANCE = .0002
MAXIMUM INDEX = 3.434
EVENNESS = .524
NO OF SPECIES = 31

STATION NUMBER - YC-3
NUMBER OF REPITITIONS - 6
DATE - 072181

TAXON	DENSITY (UNITS/MM2) REP 1	REP 2	REP 3	REP 4	REP 5	REP 6	MEAN	S.D.
BACILLARIOPHYTA								
ACHNANTHES AFFINIS	694.4	1157.4	333.2	321.5	447.8	516.7	578.5	314.9
AMPHORA COFFEIFORMIS	.0	.0	35.1	91.9	.0	.0	21.2	37.4
CYCLOTELLA MENEGHINIANA	115.7	.0	17.5	.0	.0	103.3	39.4	54.9
CYMBELLA CISTULA	.0	.0	.0	45.9	.0	.0	7.7	18.8
CYMBELLA CYMBIFORMIS VAR. NONPUNCTAT	115.7	.0	.0	.0	.0	.0	19.3	47.3
CYMBELLA MINUTA	.0	.0	.0	45.9	.0	.0	7.7	18.8
CYMBELLA MINUTA VAR. SILESIACA	.0	27.6	.0	.0	.0	34.4	10.3	16.2
GYROSIGMA SPENCERII	38.6	.0	.0	.0	.0	.0	6.4	15.8
NAVICULA CRYPTOCEPHALA VAR. VENETA	.0	55.1	17.5	.0	.0	.0	12.1	22.2
NAVICULA HELFLERI	.0	.0	.0	.0	.0	34.4	5.7	14.1
NAVICULA SECRETA VAR. APICULATA	38.6	.0	.0	91.9	.0	34.4	27.5	36.3
NAVICULA TRIPUNCTATA	.0	.0	.0	45.9	.0	.0	7.7	18.8
NAVICULA TRIPUNCTATA VAR. SCHIZONEMO	.0	.0	.0	.0	.0	34.4	5.7	14.1

NAVICULA VIRIDULA	192.9	.0	17.5	91.9	34.4	.0	56.1	75.2
NITZSCHIA FRUSTULUM	115.7	.0	491.0	183.7	.0	551.1	223.6	241.7
NITZSCHIA HOLSATICA	.0	.0	70.1	.0	.0	.0	11.7	28.6
NITZSCHIA HUNGARICA	.0	.0	.0	45.9	68.9	.0	19.1	30.5
NITZSCHIA LATENS	.0	27.6	17.5	.0	.0	.0	7.5	12.1
NITZSCHIA PALEA	.0	55.1	70.1	45.9	.0	.0	28.5	32.2
NITZSCHIA ROMANA	.0	27.6	.0	.0	.0	.0	4.6	11.3
PINNULARIA SP.	.0	27.6	.0	.0	34.4	.0	10.3	16.2
RHOPALODIA GIBBA	.0	55.1	.0	.0	.0	.0	9.2	22.5
RHOPALODIA MUSCULUS	424.4	.0	.0	275.6	206.7	.0	151.1	179.9
SURIRELLA OVALIS	.0	.0	.0	45.9	103.3	.0	24.9	42.6
SYNEDRA PULCHELLA VAR. LANCEOLATA	.0	110.2	.0	.0	.0	.0	18.4	45.0
THALASSIOSIRA FLUVIATILIS	77.2	.0	.0	.0	.0	.0	12.9	31.5
DIVISION TOTAL	1813.3	1543.2	1069.7	1331.9	895.6	1309.0	1327.1	327.4
CHLOROPHYTA								
BULBOCHAETA SP.	3896.6	2755.7	1841.3	4960.3	3651.3	3582.5	3448.0	1059.1
DIVISION TOTAL	3896.6	2755.7	1841.3	4960.3	3651.3	3582.5	3448.0	1059.1
CYANOPHYTA								
ANABAENA SP.	77.2	.0	17.5	.0	.0	.0	15.8	30.9
DIVISION TOTAL	77.2	.0	17.5	.0	.0	.0	15.8	30.9
TOTAL DENSITY	5787.0	4298.9	2928.6	6292.3	4547.0	4891.4	4790.9	1185.4

DIVERSITY INDEX CALCULATIONS

SHANNON INDEX = 1.188
VARIANCE = .0605
MAXIMUM INDEX = 3.332
EVENNESS = .357
NO OF SPECIES = 28

STATION NUMBER - WR-1
NUMBER OF REPITITIONS - 6
DATE - 072181

TAXON	DENSITY (UNITS/MM2) REP 1	REP 2	REP 3	REP 4	REP 5	REP 6	MEAN	S.D.

BACILLARIOPHYTA								
ACHNANTHES LANCEOLATA	32.2	.0	.0	.0	.0	.0	5.4	13.1
ACHNANTHES LANCEOLATA VAR. DUBIA	.0	45.9	.0	.0	.0	32.2	13.0	20.6
ACHNANTHES MINUTISSIMA	.0	.0	643.0	.0	.0	.0	107.2	262.5
AMPHORA PERPUSILLA	.0	.0	241.1	96.5	.0	.0	56.3	98.4
COCCONEIS PEDICULUS	1929.0	459.3	200.9	1880.8	1047.2	1446.8	1160.7	723.4
COCCONEIS PLACENTULA	964.5	275.6	482.3	.0	.0	32.2	292.4	381.3
CYCLOTELLA MENEGHINIANA	.0	.0	80.4	.0	.0	.0	13.4	32.8
CYMATOPLEURA SOLEA	.0	45.9	.0	48.2	.0	.0	15.7	24.3
CYMBELLA MINUTA	.0	45.9	.0	.0	.0	.0	7.7	18.8
CYMBELLA MINUTA VAR. SILESIACA	.0	.0	80.4	144.7	27.6	.0	42.1	59.2
CYMBELLA SINUATA	.0	.0	.0	.0	.0	64.3	10.7	26.3
DIATOMA TENUE VAR. ELONGATUM	.0	.0	.0	48.2	.0	.0	8.0	19.7
DIATOMA VULGARE	32.2	45.9	80.4	96.5	55.1	32.2	57.0	26.3
EPITHEMIA SOREX	3279.3	3582.5	1245.8	1687.9	1433.0	1093.1	2053.6	1089.4
FRAGILARIA CAPUCINA	.0	.0	.0	.0	.0	32.2	5.4	13.1
FRAGILARIA VAUCHERIAE	.0	.0	.0	48.2	.0	.0	8.0	19.7
GOMPHONEMA DICHOTOMUM	.0	.0	.0	.0	.0	32.2	5.4	13.1
GOMPHONEMA OLIVACEUM	32.2	.0	.0	96.5	.0	32.2	26.8	37.6
GYROSIGMA SPENCERII	32.2	.0	40.2	.0	.0	.0	12.1	18.6
NAVICULA CRYPTOCEPHALA VAR. VENETA	.0	45.9	80.4	.0	55.1	.0	30.2	35.0
NAVICULA CUSPIDATA	32.2	.0	.0	.0	.0	.0	5.4	13.1
NAVICULA HEUFLERI	.0	229.6	241.1	.0	.0	.0	76.5	121.6
NAVICULA LANCEOLATA	.0	45.9	120.6	48.2	.0	.0	35.8	47.5
NAVICULA NOTHA	.0	734.9	40.2	192.9	27.6	.0	165.9	287.9
NAVICULA RHYNCHOCEPHALA	32.2	.0	.0	48.2	.0	.0	13.4	21.4
NAVICULA TRIPUNCTATA VAR. SCHIZONEMO	32.2	275.6	200.9	96.5	.0	.0	100.9	114.6
NAVICULA VIRIDULA	835.9	183.7	.0	.0	.0	.0	169.9	334.4
NAVICULA VIRIDULA VAR. AVENACEA	.0	.0	80.4	337.6	82.7	96.5	99.5	124.2
NAVICULA VIRIDULA VAR. LINEARIS	.0	.0	40.2	.0	27.6	.0	11.3	17.9
NITZSCHIA DISSIPATA	.0	.0	.0	.0	.0	64.3	10.7	26.3
NITZSCHIA FRUSTULUM	.0	183.7	602.8	48.2	137.8	.0	162.1	226.4
NITZSCHIA LINEARIS	.0	.0	.0	48.2	27.6	.0	12.6	20.6
NITZSCHIA PALEA	.0	45.9	80.4	.0	27.6	.0	25.6	32.8
NITZSCHIA TRYBLIONELLA VAR. LEVIDENS	.0	45.9	.0	.0	.0	.0	7.7	18.8
RHOICOSPHENIA CURVATA	289.4	91.9	361.7	626.9	165.3	160.8	282.7	194.9
RHOPALODIA GIBBA	.0	.0	.0	.0	.0	64.3	10.7	26.3
RHOPALODIA GIBBERULA	.0	.0	.0	.0	27.6	.0	4.6	11.3
SYNEDRA ULNA	32.2	.0	40.2	96.5	.0	.0	26.1	38.0
DIVISION TOTAL	7555.3	6384.1	4983.3	5690.6	3141.5	3182.9	5156.3	1762.5
CHLOROPHYTA								
CLADOPHORA SP.	2572.0	4592.9	4259.9	4822.5	2755.7	3215.0	3703.0	976.7
DIVISION TOTAL	2572.0	4592.9	4259.9	4822.5	2755.7	3215.0	3703.0	976.7
CYANOPHYTA								
OSCILLATORIA SP.	.0	45.9	.0	.0	.0	.0	7.7	18.8
PHORMIDIUM SP.	.0	.0	.0	241.1	440.9	289.4	161.9	189.2
DIVISION TOTAL	.0	45.9	.0	241.1	440.9	289.4	169.6	182.1
RHODOPHYTA								

AUDOUINELLA VIOLACEA	.0	321.5	522.4	.0	.0	.0	140.7	227.0
DIVISION TOTAL	.0	321.5	522.4	.0	.0	.0	140.7	227.0
TOTAL DENSITY	10127.3	11344.4	9765.6	10754.2	6330.2	6687.2	9169.5	2130.4

DIVERSITY INDEX CALCULATIONS

SHANNON INDEX = 2.044
VARIANCE = .0002
MAXIMUM INDEX = 3.738
EVENNESS = .547
NO OF SPECIES = 42

STATION NUMBER - WR-2
NUMBER OF REPITITIONS - 6
DATE - 072181

TAXON	DENSITY (UNITS/MM2) REP 1	REP 2	REP 3	REP 4	REP 5	REP 6	MEAN	S.D.
BACILLARIOPHYTA								
ACHNANTHES MINUTISSIMA	.0	.0	91.9	.0	.0	.0	15.4	41.1
COCCONEIS PEDICULUS	.0	2514.6	5511.5	3182.9	5883.5	3658.0	4190.1	1461.6
COCCONEIS PLACENTULA	.0	.0	.0	96.5	.0	68.9	33.1	46.3
CYMBELLA MINUTA VAR. SILESIACA	.0	34.4	459.3	.0	.0	68.9	112.5	195.9
DIATOMA VULGARE	.0	34.4	.0	96.5	96.5	137.8	73.6	55.0
EPITHEMIA SOREX	.0	1584.5	4776.6	3279.3	1157.4	5029.2	3165.4	1775.8
FRAGILARIA LEPTOSTAURON	.0	34.4	.0	.0	.0	.0	8.6	15.4
FRAGILARIA VAUCHERIAE	.0	.0	275.6	.0	.0	.0	55.1	123.2
GOMPHONEMA OLIVACEUM	.0	68.9	.0	.0	96.5	206.7	74.4	85.3
NAVICULA CRYPTOCEPHALA	.0	.0	.0	96.5	.0	68.9	33.1	46.3
NAVICULA HEUFLERI	.0	.0	459.3	289.4	192.9	.0	156.3	196.6
NAVICULA LANCEOLATA	.0	.0	.0	.0	.0	68.9	13.8	30.8
NAVICULA NOTHA	.0	68.9	91.9	96.5	482.3	.0	147.9	190.9
NAVICULA PELLICULOSA	.0	.0	.0	96.5	.0	.0	19.3	43.1
NAVICULA RHYNCHOCEPHALA	.0	.0	.0	96.5	.0	.0	19.3	43.1
NAVICULA TRIPUNCTATA VAR. SCHIZONEMO	.0	68.9	91.9	.0	.0	137.8	59.7	59.9
NAVICULA VIRIDULA	.0	.0	.0	.0	.0	206.7	41.3	92.4
NAVICULA VIRIDULA VAR. AVENACEA	.0	34.4	.0	192.9	.0	.0	45.5	83.8
NAVICULA VIRIDULA VAR. LINEARIS	.0	.0	.0	.0	96.5	.0	19.3	43.1
NITZSCHIA DISSIPATA	.0	34.4	.0	.0	.0	68.9	20.7	30.8
NITZSCHIA FRUSTULUM	.0	275.6	.0	385.8	675.2	344.5	336.2	241.9
NITZSCHIA HUNGARICA	.0	.0	91.9	96.5	.0	.0	37.7	51.6
NITZSCHIA IGNORATA	.0	.0	.0	.0	.0	68.9	13.8	30.8
NITZSCHIA LINEARIS	.0	34.4	.0	.0	.0	.0	8.6	15.4
NITZSCHIA PALEA	.0	34.4	.0	96.5	.0	.0	26.2	42.0
RHOICOSPHENIA CURVATA	.0	310.0	2204.6	385.8	192.9	1377.9	894.2	872.2
DIVISION TOTAL	.0	5132.6	14054.2	8467.7	8873.5	11711.9	9448.0	3491.5

CHLOROPHYTA								
CLADOPHORA SP.	.0	3444.7	10379.9	9645.1	9838.0	6889.3	8039.4	2903.7
DIVISION TOTAL	.0	3444.7	10379.9	9645.1	9838.0	6889.3	8039.4	2903.7
CYANOPHYTA								
ANABAENA SP.	.0	.0	275.6	.0	.0	.0	95.1	123.2
OSCILLATORIA SP.	.0	.0	.0	.0	192.9	.0	38.6	86.3
PHORMIDIUM SP.	.0	1446.8	.0	578.7	1446.8	344.5	763.3	657.0
DIVISION TOTAL	.0	1446.8	275.6	578.7	1639.7	344.5	857.0	640.0
RHODOPHYTA								
AUDOUINELLA VIOLACEA	.0	447.8	.0	.0	.0	.0	89.6	200.3
DIVISION TOTAL	.0	447.8	.0	.0	.0	.0	89.6	200.3
TOTAL DENSITY	.0	10471.8	24709.7	18711.4	20351.1	18945.7	18637.9	5162.1

DIVERSITY INDEX CALCULATIONS

SHANNON INDEX = 1.724
VARIANCE = .0001
MAXIMUM INDEX = 3.434
EVENNESS = .502
NO OF SPECIES = 31

PERIPHYTON DENSITY AND SPECIES DIVERSITY ESTIMATES

RIO BLANCO OIL SHALE COMPANY
TRACT C-A

STATION NUMBER - CG-1
NUMBER OF REPITITIONS - 6
DATE - 100981

TAXON	DENSITY (UNITS/MM2) REP 1	REP 2	REP 3	REP 4	REP 5	REP 6	MEAN	S.D.
BACILLARIOPHYTA								
ACHNANTHES AFFINIS	.0	139.3	.0	.0	.0	.0	23.2	56.9
ACHNANTHES LANCEOLATA	.0	.0	.0	.0	.0	6.0	1.0	2.5
ACHNANTHES LANCEOLATA VAR. DUBIA	382.7	1093.1	187.4	.0	.0	.0	277.2	427.9
CYMBELLA MINUTA VAR. SILESIACA	11.5	10.7	.0	25.7	.0	.0	8.0	10.3
EPITHEMIA TURGIDA	.0	.0	.0	.0	12.4	.0	2.1	5.1
FRAGILARIA VAUCHERIAE	.0	42.9	.0	.0	.0	.0	7.1	17.5
GOMPHONEMA ANGUSTATUM	7.7	.0	.0	.0	.0	.0	1.3	3.1
NAVICULA CRYPTOCEPHALA VAR. VENETA	.0	53.6	.0	25.7	12.4	54.3	24.3	24.8
NAVICULA HALOPHILA	.0	.0	.0	.0	.0	6.0	1.0	2.5
NAVICULA HEUFLERI	.0	.0	.0	.0	.0	6.0	1.0	2.5
NAVICULA SECRETA VAR. APICULATA	7.7	139.3	5.5	591.6	273.8	633.0	275.1	279.6
NAVICULA VIRIDULA VAR. AVENACEA	3.8	.0	.0	.0	.0	24.1	4.7	9.7
NITZSCHIA FRUSTULUM	103.3	53.6	551.1	2649.2	1257.0	18.1	772.1	1033.4
NITZSCHIA LINEARIS	.0	10.7	.0	25.7	.0	.0	6.1	10.5
NITZSCHIA PALEA	.0	.0	.0	205.8	.0	.0	34.3	84.0
NITZSCHIA SP.	.0	.0	11.0	.0	.0	.0	1.8	4.5
SURIRELLA OVATA	.0	32.2	.0	.0	.0	.0	5.4	13.1
SYNEDRA ULNA	3.8	21.4	.0	.0	.0	.0	4.2	8.6
DIVISION TOTAL	520.5	1596.8	755.1	3523.7	1555.7	747.5	1449.9	1111.1
CHLOROPHYTA								
BULBOCHAETA SP.	.0	32.2	.0	.0	.0	.0	5.4	13.1
CLADOPHORA SP.	.0	214.3	.0	.0	.0	.0	35.7	87.5
DIVISION TOTAL	.0	246.5	.0	.0	.0	.0	41.1	100.6
CYANOPHYTA								
ANABAENA SP.	.0	10.7	.0	.0	.0	.0	1.8	4.4
PHORMIDIUM SP.	.0	.0	.0	1363.2	87.1	.0	241.7	550.3
DIVISION TOTAL	.0	10.7	.0	1363.2	87.1	.0	243.5	549.6
TOTAL DENSITY	520.5	1854.0	755.1	4886.8	1642.8	747.5	1734.4	1635.1

DIVERSITY INDEX CALCULATIONS

SHANNON INDEX = 1.669
VARIANCE = .0007
MAXIMUM INDEX = 3.091
EVENNESS = .540
NO OF SPECIES = 22

STATION NUMBER - YC-1
NUMBER OF REPITITIONS - 6
DATE - 100981

TAXON	DENSITY (UNITS/MM2) REP 1	REP 2	REP 3	REP 4	REP 5	REP 6	MEAN	S.D.
BACILLARIOPHYTA								
ACHNANTHES AFFINIS	1821.8	1212.5	592.5	1065.9	804.7	617.3	1019.1	463.3
ACHNATHES HAUCKIANA VAR. ROSTRATA	.0	91.9	.0	.0	.0	.0	15.3	37.5
ACHNANTHES LANCEOLATA VAR. OURIA	.0	55.1	.0	55.1	22.0	.0	22.0	27.0
AMPHORA OVALIS	.0	36.7	.0	.0	.0	.0	6.1	15.0
COCCONEIS PEDICULUS	.0	18.4	13.8	55.1	.0	.0	14.5	21.4
COCCONEIS PLACENTULA	21.4	18.4	27.6	.0	33.1	.0	16.7	13.9
CYCLOTELLA MENEGHINIANA	171.5	55.1	68.9	55.1	.0	128.6	79.9	60.8
CYMBELLA SINUATA	.0	.0	13.8	.0	.0	.0	2.3	5.6
ENTOMONEIS ORNATA	.0	36.7	.0	.0	.0	.0	6.1	15.0
GOMPHONEMA ANGUSTATUM	107.2	165.3	.0	.0	110.2	295.6	113.1	111.1
GYROSIGMA SPENCERII	.0	36.7	.0	.0	.0	.0	6.1	15.0
HANTZSCHIA AMPHIOXYS	.0	.0	.0	55.1	.0	.0	9.2	22.5
MASTOGLOIA GREVILLEI	.0	.0	13.8	.0	.0	.0	2.3	5.6
NAVICULA CRYPTOCEPHALA VAR. VENETA	64.3	73.5	55.1	18.4	.0	38.6	41.6	26.3
NAVICULA HALOPHILA	.0	.0	.0	.0	11.0	.0	1.8	4.5
NAVICULA HEUFLERI	.0	.0	.0	.0	11.0	.0	1.8	4.5
NAVICULA NOTHA	128.6	.0	82.7	55.1	88.2	12.9	61.2	48.7
NAVICULA PELLICULOSA	.0	18.4	.0	.0	.0	.0	3.1	7.5
NAVICULA PROTRACTA	21.4	.0	.0	18.4	.0	.0	6.6	10.3
NAVICULA SECRETA VAR. APICULATA	.0	.0	13.8	.0	22.0	167.2	33.6	66.0
NAVICULA VIRIDULA VAR. AVENACEA	21.4	18.4	.0	.0	11.0	.0	8.5	9.5
NITZSCHIA DISSIPATA	.0	.0	.0	18.4	.0	.0	3.1	7.5
NITZSCHIA FRUSTULUM	1586.1	2131.1	1515.7	1837.2	1102.3	1196.0	1561.4	388.7
NITZSCHIA HUNGARICA	.0	36.7	.0	.0	.0	.0	6.1	15.0
NITZSCHIA IGNORATA	.0	18.4	.0	.0	.0	.0	3.1	7.5
NITZSCHIA PALEA	21.4	91.9	13.8	.0	.0	.0	21.2	35.6
NITZSCHIA TRYBLIONELLA VAR. LEVIDENS	.0	.0	13.8	.0	.0	.0	2.3	5.6
NITZSCHIA SP.	.0	.0	.0	18.4	.0	.0	3.1	7.5
PINNULARIA SP.	.0	18.4	.0	.0	.0	.0	3.1	7.5
PLEUROSIGMA DELICATISSIMA	.0	.0	13.8	.0	.0	.0	2.3	5.6
RHOPALODIA GIBBA	21.4	18.4	27.6	.0	.0	.0	11.2	12.8
RHOPALODIA MUSCULUS	.0	.0	82.7	202.1	77.2	167.2	86.2	93.6
STAURONUS SP.	.0	.0	13.8	.0	.0	.0	2.3	5.6
SYNEDRA MINUSCULA	.0	.0	.0	18.4	.0	.0	3.1	7.5
SYNEDRA ULNA	.0	.0	.0	.0	11.0	12.9	4.0	6.2
SYNEDRA SP.	.0	.0	.0	18.4	.0	.0	3.1	7.5
THALASSIOSIRA FLUVIATILIS	.0	55.1	.0	.0	11.0	.0	11.0	22.5

DIVISION TOTAL	3986.6	4207.1	2562.8	3490.6	2314.8	2636.3	3199.7	803.1
CHLOROPHYTA								
BULBOCHAETA SP.	2229.1	918.6	413.4	551.1	992.1	1286.0	1065.0	651.1
DIVISION TOTAL	2229.1	918.6	413.4	551.1	992.1	1286.0	1065.0	651.1
TOTAL DENSITY	6215.7	5125.7	2976.2	4041.7	3306.9	3922.3	4264.8	1207.7

DIVERSITY INDEX CALCULATIONS

SHANNON INDEX = 1.741
VARIANCE = .0004
MAXIMUM INDEX = 3.638
EVENNESS = .479
NO OF SPECIES = 38

STATION NUMBER - YC-2
NUMBER OF REPITITIONS - 6
DATE - 100881

TAXON	DENSITY (UNITS/MM2) REP 1	REP 2	REP 3	REP 4	REP 5	REP 6	MEAN	S.D.
BACILLARIOPHYTA								
ACHNANTHES AFFINIS	723.4	144.7	241.1	361.7	.0	.0	245.1	273.0
ACHNATHES HAUCKIANA VAR. ROSTRATA	795.7	626.9	723.4	940.4	128.6	296.8	585.3	310.8
ACHNANTHES LANCEOLATA VAR. DUBIA	.0	144.7	.0	72.3	.0	.0	36.2	66.5
COCCONEIS PEDICULUS	.0	.0	60.3	.0	.0	.0	10.0	24.6
COCCONEIS PLACENTULA	72.3	144.7	.0	217.0	.0	37.1	78.5	86.8
CYMBELLA CISTULA	.0	48.2	.0	.0	.0	.0	8.0	19.7
CYMBELLA MINUTA	.0	.0	.0	72.3	.0	.0	12.1	29.5
CYMBELLA MINUTA VAR. SILESIACA	217.0	.0	.0	72.3	.0	.0	48.2	87.6
DIATOMA TENUE VAR. ELONGATUM	.0	.0	60.3	.0	.0	.0	10.0	24.6
DIATOMA VULGARE	.0	.0	.0	.0	64.3	.0	10.7	26.3
GOMPHONEMA OLIVACEUM	.0	48.2	.0	.0	.0	.0	8.0	19.7
GYROSIGMA SPENCERII	.0	.0	.0	.0	.0	37.1	6.2	15.1
NAVICULA CRYPTOCEPHALA VAR. VENETA	.0	.0	60.3	144.7	64.3	37.1	51.1	53.7
NAVICULA VIRIDULA VAR. AVENACEA	72.3	.0	.0	.0	.0	.0	12.1	29.5
NITZSCHIA FRUSTULUM	795.7	1109.2	2531.8	1446.8	2057.6	1335.5	1546.1	639.0
NITZSCHIA HOLSATICA	.0	.0	.0	.0	192.9	.0	32.2	78.8
NITZSCHIA HUNGARICA	.0	.0	.0	.0	.0	74.2	12.4	30.3

NITZSCHIA IGNORATA	.0	.0	.0	72.3	.0	.0	12.1	29.5
NITZSCHIA LINEARIS	.0	48.2	.0	.0	.0	.0	8.0	19.7
NITZSCHIA PALEA	.0	.0	.0	.0	64.3	.0	10.7	26.3
NITZSCHIA TRYBLIONELLA VAR. LEVIDENS	72.3	.0	.0	.0	.0	.0	12.1	29.5
PLEUROSIGMA DELICATISSIMA	.0	.0	.0	72.3	.0	37.1	18.2	30.4
RHOICOSPHENIA CURVATA	72.3	96.5	60.3	.0	.0	185.5	69.1	69.2
RHOPALODIA GIBBA	289.4	96.5	482.3	72.3	192.9	185.5	219.8	150.1
RHOPALODIA MUSCULUS	.0	.0	241.1	144.7	.0	.0	64.3	104.2
SURIRELLA OVALIS	.0	.0	.0	.0	64.3	.0	10.7	26.3
SYNEDRA FASCICULATA	.0	.0	120.6	72.3	128.6	.0	53.6	61.8
SYNEDRA ULNA VAR. OXYRHYNCHUS	144.7	.0	.0	.0	.0	.0	24.1	59.1
DIVISION TOTAL	3255.2	2507.7	4581.4	3761.6	2957.8	2225.8	3214.9	861.7
CHLOROPHYTA								
BULBOCHAETA SP.	7740.2	5738.8	6992.7	7233.8	6430.0	4006.4	6357.0	1341.5
DIVISION TOTAL	7740.2	5738.8	6992.7	7233.8	6430.0	4006.4	6357.0	1341.5
CYANOPHYTA								
ANABAENA SP.	.0	.0	482.3	.0	.0	.0	80.4	196.9
DIVISION TOTAL	.0	.0	482.3	.0	.0	.0	80.4	196.9
TOTAL DENSITY	10995.4	8246.5	12056.3	10995.4	9387.9	6232.2	9652.3	2150.8

DIVERSITY INDEX CALCULATIONS

SHANNON INDEX = 1.317
VARIANCE = .0002
MAXIMUM INDEX = 3.401
EVENNESS = .387
NO OF SPECIES = 30

STATION NUMBER - YC-3
NUMBER OF REPITITIONS - 6
DATE - 100881

TAXON	DENSITY (UNITS/MM2) REP 1	REP 2	REP 3	REP 4	REP 5	REP 6	MEAN	S.D.
BACILLARIOPHYTA								

ACHNANTHES AFFINIS	.0	597.1	663.1	1028.8	.0	321.5	435.1	405.1
AMPHORA OVALIS	160.8	.0	.0	.0	.0	.0	26.8	65.6
CYCLOTELLA MENEGHINIANA	.0	.0	20.1	192.9	17.5	267.9	83.1	116.9
CYMBELLA AFFINIS	.0	.0	.0	64.3	.0	.0	10.7	26.3
CYMBELLA CISTULA	.0	.0	40.2	192.9	17.5	.0	41.8	75.7
CYMBELLA MINUTA	64.3	45.9	20.1	64.3	.0	.0	32.4	29.9
CYMBELLA MINUTA VAR. SILESIACA	.0	.0	.0	64.3	.0	.0	10.7	26.3
GOMPHONEMA OICHOTOMUM	.0	.0	.0	.0	17.5	.0	2.9	7.2
HANTZSCHIA AMPHIOXYS	.0	.0	.0	.0	.0	53.6	8.9	21.9
NAVICULA CRYPTOCEPHALA	64.3	.0	.0	.0	.0	.0	10.7	26.3
NAVICULA CRYPTOCEPHALA VAR. VENETA	.0	.0	.0	.0	17.5	.0	2.9	7.2
NAVICULA HEUFLERI	.0	.0	.0	.0	52.6	.0	8.8	21.5
NAVICULA LUZONENSIS	.0	45.9	.0	.0	.0	.0	7.7	18.8
NAVICULA NOTHA	32.2	.0	.0	64.3	35.1	.0	21.9	26.5
NAVICULA VIRIDULA	64.3	45.9	40.2	64.3	.0	803.8	169.7	311.5
NAVICULA SP.	.0	.0	40.2	.0	17.5	.0	9.6	16.5
NITZSCHIA FRUSTULUM	707.3	.0	261.2	192.9	631.3	1553.9	557.6	557.2
NITZSCHIA LATENS	.0	45.9	.0	257.2	.0	160.8	77.3	107.9
NITZSCHIA LINEARIS	128.6	.0	120.6	514.4	52.6	.0	136.0	193.6
NITZSCHIA PALEA	32.2	183.7	.0	.0	.0	.0	36.0	73.5
NITZSCHIA ROMANA	.0	137.8	.0	.0	35.1	.0	26.6	55.2
NITZSCHIA SIGMOIDEA	.0	45.9	60.3	128.6	17.5	.0	42.1	48.9
NITZSCHIA TRYBLIONELLA VAR. LEVIDENS	32.2	.0	.0	.0	.0	.0	5.4	13.1
PINNULARIA PREBISSONII	.0	.0	.0	64.3	70.1	.0	22.4	34.8
PLEUROSIGMA DELICATISSIMA	64.3	45.9	20.1	.0	.0	53.6	30.7	27.9
RHOPALODIA GIBBA	.0	91.9	40.2	.0	35.1	267.9	72.5	101.5
RHOPALODIA MUSCULUS	1253.9	459.3	80.4	2379.1	385.8	696.6	675.8	834.4
STAURONIS SP.	.0	.0	20.1	.0	.0	.0	3.3	8.2
SYNEDRA FASCICULATA	64.3	.0	20.1	.0	.0	.0	14.1	25.9
SYNEDRA PULCHELLA VAR. LANCEOLATA	.0	1423.8	401.9	450.1	.0	964.5	540.0	560.7
UNIDENTIFIED PENNATE DIATOMS	.0	.0	.0	.0	.0	321.5	53.6	131.3
DIVISION TOTAL	2668.5	3169.1	1848.6	5722.7	1402.9	5465.5	3379.6	1824.4
CHLOROPHYTA								
BULBOCHAETA SP.	3215.0	4914.4	2089.8	6430.0	1788.7	5626.3	4010.7	1925.6
DIVISION TOTAL	3215.0	4914.4	2089.8	6430.0	1788.7	5626.3	4010.7	1925.6
CYANOPHYTA								
OSCILLATORIA SP.	32.2	.0	.0	.0	.0	.0	5.4	13.1
DIVISION TOTAL	32.2	.0	.0	.0	.0	.0	5.4	13.1
TOTAL DENSITY	5915.6	8083.5	3938.4	12152.8	3191.6	11091.8	7395.6	3763.6

DIVERSITY INDEX CALCULATIONS

SHANNON INDEX = 1.777
VARIANCE = .0003

MAXIMUM INDEX = 3.497
EVENNESS = .508
NO OF SPECIES = 33

STATION NUMBER - WR-1
NUMBER OF REPITITIONS - 6
DATE - 100881

TAXON	DENSITY (UNITS/MM2) REP 1	REP 2	REP 3	REP 4	REP 5	REP 6	MEAN	S.D.
BACILLARIOPHYTA								
ACHNANTHES MINUTISSIMA	727.5	.0	519.7	1061.0	.0	117.9	404.3	437.7
AMPHIPLEURA PELLUCIDA	.0	.0	.0	117.9	.0	.0	19.6	48.1
AMPHORA PERPUSILLA	727.5	.0	.0	.0	.0	235.8	160.5	293.3
CALONEIS AMPHISBAENA	.0	.0	.0	.0	.0	58.9	9.8	24.1
COCCONEIS PEDICULUS	485.0	1714.7	5456.3	3890.2	4413.6	1886.1	2974.3	1899.4
COCCONEIS PLACENTULA	363.8	85.7	952.7	943.1	169.8	.0	419.2	426.9
CYCLOTELLA MENEGHINIANA	363.8	.0	.0	707.3	.0	.0	178.5	297.1
CYMBELLA MINUTA VAR. SILESIACA	121.3	42.9	.0	.0	84.9	117.9	61.1	55.1
DIATOMA VULGARE	121.3	128.6	.0	589.4	84.9	117.9	173.7	209.2
EPITHEMIA SOREX	2788.8	2314.8	3291.1	2357.7	2206.8	766.2	2287.6	846.8
FRAGILARIA PINNATA	.0	42.9	.0	.0	.0	.0	7.1	17.5
FRUSTULIA RHOMBOIDES	.0	.0	86.6	.0	.0	.0	14.4	35.4
GOMPHONEMA ANGUSTATUM	121.3	.0	.0	.0	.0	.0	20.2	49.5
GOMPHONEMA DICHOTOMUM	.0	.0	.0	117.9	169.8	.0	47.9	76.1
GOMPHONEMA OLIVACEUM	.0	171.5	86.6	471.5	.0	117.9	141.2	175.2
GYROSIGMA SPENCERII	.0	.0	173.2	.0	.0	58.9	38.7	70.0
HANTZSCHIA AMPHIOXYS	.0	42.9	.0	.0	.0	.0	7.1	17.5
NAVICULA CINCTA	.0	.0	86.6	.0	.0	58.9	24.3	38.6
NAVICULA CRYPTOCEPHALA	.0	42.9	.0	.0	.0	.0	7.1	17.5
NAVICULA CRYPTOCEPHALA VAR. VENETA	.0	.0	86.6	117.9	254.6	.0	76.5	101.1
NAVICULA GASTRUM	121.3	.0	.0	.0	.0	.0	20.2	49.5
NAVICULA HEUFLERI	.0	85.7	86.6	471.5	.0	.0	107.3	183.4
NAVICULA NOTHA	.0	171.5	433.0	353.7	84.9	.0	173.8	183.2
NAVICULA PYGMAEA	.0	42.9	.0	.0	.0	.0	7.1	17.5
NAVICULA RADIOSA	.0	42.9	.0	.0	.0	.0	7.1	17.5
NAVICULA RHYNCHOCEPHALA	.0	85.7	606.3	235.8	84.9	117.9	188.4	218.4
NAVICULA SECRETA VAR. APICULATA	.0	.0	.0	.0	84.9	.0	14.1	34.7
NAVICULA TRIPUNCTATA VAR. SCHIZONEMO	.0	42.9	606.3	117.9	.0	.0	127.6	238.8
NAVICULA VIRIDULA VAR. AVENACEA	242.5	257.2	692.9	117.9	424.4	235.8	329.4	203.7
NAVICULA VIRIDULA VAR. LINEARIS	121.3	.0	.0	.0	.0	.0	20.2	49.5
NITZSCHIA ACICULARIS	.0	.0	.0	353.7	.0	.0	58.9	144.4
NITZSCHIA DENTICULA	.0	.0	.0	235.8	.0	.0	39.3	96.3
NITZSCHIA DISSIPATA	.0	42.9	.0	.0	.0	.0	7.1	17.5
NITZSCHIA FRUSTULUM	.0	1200.3	779.5	589.4	169.8	589.4	554.7	430.3
NITZSCHIA HUNGARICA	121.3	.0	.0	.0	.0	.0	20.2	49.5
NITZSCHIA LATENS	.0	128.6	.0	.0	.0	.0	21.4	52.5
NITZSCHIA LINEARIS	606.3	.0	173.2	.0	.0	.0	129.9	243.4
NITZSCHIA PALEA	121.3	.0	86.6	235.8	.0	412.6	142.7	158.6
NITZSCHIA SIGMOIDIA	.0	.0	86.6	239.6	.0	.0	53.7	95.7
NITZSCHIA SP.	.0	.0	.0	.0	.0	353.7	58.9	144.4
RHOICOSPHENIA CURVATA	1697.5	257.2	433.0	589.4	.0	589.4	594.4	584.8
RHOPALODIA GIBBA	.0	.0	.0	.0	84.9	.0	14.1	34.7
STAURONIS SP.	.0	42.9	.0	.0	.0	.0	7.1	17.5
SURIRELLA LINEARIS	.0	.0	.0	.0	84.9	.0	14.1	34.7

SYNEDRA ULNA	.0	.0	66.6	353.7	.0	176.8	102.8	141.7
THALASSIOSIRA FLUVIATILIS	.0	.0	86.6	.0	.0	.0	14.4	35.4
DIVISION TOTAL	8851.4	6987.3	14896.7	14264.0	8402.8	6012.1	9902.4	3767.0
CHLOROPHYTA								
CLADOPHORA SP.	606.3	4501.0	8920.7	11788.4	9166.7	5894.2	6812.9	3986.2
DIVISION TOTAL	606.3	4501.0	8920.7	11788.4	9166.7	5894.2	6812.9	3986.2
CYANOPHYTA								
OSCILLATORIA SP.	.0	.0	.0	.0	84.9	.0	14.1	34.7
PHORMIDIUM SP.	12489.0	.0	.0	1768.3	594.1	589.4	2573.5	4900.3
DIVISION TOTAL	12489.0	.0	.0	1768.3	679.0	589.4	2587.6	4893.6
TOTAL DENSITY	21946.6	11488.3	23817.4	27820.6	18248.5	12495.7	19302.9	8456.6

DIVERSITY INDEX CALCULATIONS

SHANNON INDEX = 2.269
VARIANCE = .0001
MAXIMUM INDEX = 3.892
EVENNESS = .583
NO OF SPECIES = 49

STATION NUMBER - WR-2
NUMBER OF REPITITIONS - 6
DATE - 100881

TAXON	DENSITY (UNITS/MM2) REP 1	REP 2	REP 3	REP 4	REP 5	REP 6	MEAN	S.D.
BACILLARIOPHYTA								
ACHNANTHES AFFINIS	.0	.0	.0	.0	141.5	.0	23.6	57.8
ACHNANTHES HAUCKIANA VAR. ROSTRATA	.0	.0	.0	.0	94.3	.0	15.7	38.5
ACHNANTHES LANCEOLATA VAR. DUBIA	.0	44.2	.0	.0	141.5	.0	30.9	57.0
ACHNANTHES MINUTISSIMA	.0	44.2	196.5	.0	424.4	242.5	151.3	168.6
AMPHIPLEURA PELLUCIDA	.0	.0	.0	.0	.0	60.6	10.1	24.8
AMPHORA PERPUSILLA	424.4	88.4	78.6	.0	.0	.0	98.6	164.8
COCCONEIS PEDICULUS	282.9	618.9	117.9	943.1	1037.4	3273.8	1045.7	1148.9
COCCONEIS PLACENTULA	.0	.0	.0	.0	47.2	.0	7.9	19.3

CYCLOTELLA MENEGHINIANA	.0	.0	.0	72.5	.0	181.9	42.4	74.2
CYMATOPLEURA SOLEA	.0	44.2	.0	.0	.0	.0	7.4	18.0
CYMBELLA MINUTA VAR. SILESIACA	.0	.0	196.9	36.3	.0	60.6	46.9	76.5
DIATOMA VULGARE	282.9	.0	78.6	.0	47.2	60.6	76.2	105.3
EPITHEMIA SOREX	212.2	574.7	1336.0	1378.3	1037.4	1758.2	1049.5	569.1
EPITHEMIA TURGIDA	.0	.0	.0	36.3	.0	.0	6.6	14.8
GOMPHONEMA OLIVACEUM	.0	.0	.0	36.3	.0	60.6	16.1	26.2
GYROSIGMA SPENCERII	.0	88.4	.0	.0	47.2	.0	22.6	37.4
NAVICULA CINCTA VAR. ROSTRATA	.0	.0	39.3	.0	.0	.0	6.5	16.0
NAVICULA CRYPTOCEPHALA VAR. VENETA	353.7	44.2	589.4	72.5	235.8	121.3	236.1	207.6
NAVICULA CUSPIDATA	.0	.0	.0	.0	47.2	.0	7.9	19.3
NAVICULA HEUFLERI	.0	.0	157.2	72.5	.0	303.1	88.8	122.1
NAVICULA LANCEOLATA	.0	44.2	.0	.0	.0	.0	7.4	18.0
NAVICULA NOTHA	70.7	.0	78.6	145.1	188.6	60.6	90.6	66.7
NAVICULA RHYNCHOCEPHALA	70.7	353.7	39.3	72.5	141.5	.0	112.9	126.8
NAVICULA SALINARUM VAR. INTERMEDIA	.0	353.7	.0	36.3	.0	.0	65.0	142.2
NAVICULA SECRETA VAR. APICULATA	.0	.0	.0	.0	.0	60.6	10.1	24.8
NAVICULA TRIPUNCTATA VAR. SCHIZONEMA	.0	.0	.0	.0	47.2	.0	7.9	19.3
NAVICULA VIRIDULA	70.7	.0	.0	.0	.0	.0	11.8	28.9
NAVICULA VIRIDULA VAR. AVENACEA	70.7	265.2	785.9	544.1	565.8	485.0	452.8	250.7
NITZSCHIA DISSIPATA	.0	.0	.0	.0	47.2	.0	7.9	19.3
NITZSCHIA FRUSTULUM	282.9	707.3	432.2	362.7	330.1	363.8	413.2	152.1
NITZSCHIA HUNGARICA	.0	88.4	.0	.0	94.3	.0	30.5	47.2
NITZSCHIA LINEARIS	.0	.0	.0	.0	47.2	60.6	18.0	28.2
NITZSCHIA PALEA	.0	132.6	314.4	36.3	282.9	242.5	168.1	131.9
NITZSCHIA SIGMOIDEA	.0	44.2	.0	36.3	.0	.0	13.4	20.9
NITZSCHIA SP.	.0	221.0	.0	.0	.0	.0	36.8	90.2
RHOICOSPHENIA CURVATA	353.7	.0	117.9	108.8	282.9	788.1	275.2	282.0
RHOPALODIA GIBBA	.0	88.4	78.6	72.5	47.2	121.3	68.0	41.1
SURIRELLA OVALIS	.0	.0	39.3	.0	.0	.0	6.5	16.0
SYNEDRA ULNA	.0	.0	.0	72.5	.0	.0	12.1	29.6
DIVISION TOTAL	2475.6	3846.0	4676.1	4135.0	5375.5	8305.8	4802.3	1969.4
CHLOROPHYTA								
CLADOPHORA SP.	7285.2	4951.1	4008.1	3627.2	4715.4	6062.6	5108.3	1358.9
DIVISION TOTAL	7285.2	4951.1	4008.1	3627.2	4715.4	6062.6	5108.3	1358.9
CYANOPHYTA								
CALOTHRIX SP.	707.3	.0	.0	.0	.0	.0	117.9	286.8
PHORMIDIUM SP.	424.4	486.3	1061.0	906.8	707.3	606.3	698.7	246.4
DIVISION TOTAL	1131.7	486.3	1061.0	906.8	707.3	606.3	816.5	257.8
RHODOPHYTA								
AUDOUINELLA VIOLACEA	.0	.0	.0	.0	.0	424.4	70.7	173.3
DIVISION TOTAL	.0	.0	.0	.0	.0	424.4	70.7	173.3
TOTAL DENSITY	10892.5	9283.4	9745.1	8669.0	10798.2	15349.3	10797.9	2413.0

DIVERSITY INDEX CALCULATIONS

SHANNON INDEX = 2.130
VARIANCE = .0002
MAXIMUM INDEX = 3.761
EVENNESS = .566
NO OF SPECIES = 43

APPENDIX 4-2.5

Statistical Analysis of the 1979-1981 RBOSC Periphyton Densities

RIO BLANCO OIL SHALE COMPANY
AQUATIC ECOLOGY MONITORING PROGRAM

THREE-WAY MIXED MODEL ANALYSIS OF VARIANCE
COMPARING PERIPHYTON DENSITY ESTIMATES

GENERAL LINEAR MODELS PROCEDURE

CLASS LEVEL INFORMATION

CLASS	LEVELS	VALUES
YEAR	3	1979 1980 1981
SEASON	3	FALL SPRING SUMMER
STATION	6	CORRAL GULCH - 1 WHITE RIVER - 1 WHITE RIVER - 2 YELLOW CREEK - 1 YELLOW CREEK - 2 YELLOW CREEK - 3

NUMBER OF OBSERVATIONS IN DATA SET = 2302

NOTE: ALL DEPENDENT VARIABLES ARE CONSISTENT WITH RESPECT TO THE PRESENCE OR ABSENCE OF MISSING VALUES. HOWEVER, ONLY 2301 OBSERVATIONS IN DATA SET CAN BE USED IN THIS ANALYSIS.

RIO BLANCO OIL SHALE COMPANY
AQUATIC ECOLOGY MONITORING PROGRAM

THREE-WAY MIXED MODEL ANALYSIS OF VARIANCE
COMPARING PERIPHYTON DENSITY ESTIMATES

GENERAL LINEAR MODELS PROCEDURE

DEPENDENT VARIABLE: DENSITY

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE
MODEL	41	362586?6.87487316	884358.46036276
ERROR	2259	605405680.11153280	267997.20235128
CORRECTED TOTAL	2300	641664376.98640600	

MODEL F =	3.30	PR > F = 0.0001

R-SQUARE	C.V.	STD DEV	DENSITY MEAN
0.056507	460.7696	517.68446215	112.35213675

SOURCE	DF	TYPE I SS	F VALUE	PR > F
YEAR	2	5963241.80141323	11.13 —	0.0001
SEASON	2	1456364.57864053	2.72	0.0663
STATION	5	1954026.81110686	1.46	0.1991
YEAR*SEASON	4	2244886.23941154	2.09	0.0791
YEAR*STATION	6	7615374.53457420	4.74 —	0.0001
SEASON*STATION	10	4584786.46423245	1.71	0.0728
YEAR*SEASON*STATION	12	12440016.44549432	3.87 —	0.0001

RIO BLANCO OIL SHALE COMPANY
AQUATIC ECOLOGY MONITORING PROGRAM

TWO-WAY MODEL I ANALYSIS OF VARIANCE
COMPARING PERIPHYTON DENSITY ESTIMATES

GENERAL LINEAR MODELS PROCEDURE

CLASS LEVEL INFORMATION

CLASS	LEVELS	VALUES
STATION	6	CORRAL GULCH - 1 WHITE RIVER - 1 WHITE RIVER - 2 YELLOW CREEK - 1 YELLOW CREEK - 2 YELLOW CREEK - 3
SEASON	3	FALL SPRING SUMMER

NUMBER OF OBSERVATIONS IN DATA SET = 855

NOTE: ALL DEPENDENT VARIABLES ARE CONSISTENT WITH RESPECT TO THE PRESENCE OR ABSENCE OF MISSING VALUES. HOWEVER, ONLY 854 OBSERVATIONS IN DATA SET CAN BE USED IN THIS ANALYSIS.

RIO BLANCO OIL SHALE COMPANY
AQUATIC ECOLOGY MONITORING PROGRAM

TWO-WAY MODEL I ANALYSIS OF VARIANCE
COMPARING PERIPHYTON DENSITY ESTIMATES

GENERAL LINEAR MODELS PROCEDURE

DEPENDENT VARIABLE: DENSITY

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE
MODEL	17	1860117.58947557	109418.68173386
ERROR	836	277709782.22837400	332188.73472294
CORRECTED TOTAL	853	279569899.81784957	

MODEL F =	0.33		PR > F = 0.9951

R-SQUARE	C.V.	STD DEV	DENSITY MEAN
0.006653	323.0430	576.35816531	178.41530055

SOURCE	DF	TYPE I SS	F VALUE	PR > F
STATION	5	977231.75918603	0.59	0.7115
SEASON	2	35042.66105132	0.05	0.9486
STATION*SEASON	10	847843.16923817	0.26	0.9900

RIO BLANCO OIL SHALE COMPANY
AQUATIC ECOLOGY MONITORING PROGRAM

ONE-WAY MODEL I ANALYSIS OF VARIANCE
COMPARING PERIPHYTON DENSITY ESTIMATES
AT EACH STATION SAMPLED IN 1981
STATION=CORRAL GULCH - 1

GENERAL LINEAR MODELS PROCEDURE

CLASS LEVEL INFORMATION

CLASS	LEVELS	VALUES
SEASON	3	FALL SPRING SUMMER

NUMBER OF OBSERVATIONS IN BY GROUP = 96

RIO BLANCO OIL SHALE COMPANY
AQUATIC ECOLOGY MONITORING PROGRAM

ONE-WAY MODEL I ANALYSIS OF VARIANCE
COMPARING PERIPHYTON DENSITY ESTIMATES
AT EACH STATION SAMPLED IN 1981
STATION=CORRAL GULCH - 1

GENERAL LINEAR MODELS PROCEDURE

DEPENDENT VARIABLE: DENSITY

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE
MODEL	2	209702.61914012	104851.30957006
ERROR	93	41725008.02900793	448656.00031191
CORRECTED TOTAL	95	41934710.64814806	

MODEL F = 0.23 PR > F = 0.7921

R-SQUARE	C.V.	STD DEV	DENSITY MEAN
0.005001	257.5535	669.81788593	260.06944444

SOURCE	DF	TYPE I SS	F VALUE	PR > F
SEASON	2	209702.61914012	0.23	0.7921

RIO BLANCO OIL SHALE COMPANY
AQUATIC ECOLOGY MONITORING PROGRAM

ONE-WAY MODEL I ANALYSIS OF VARIANCE
COMPARING PERIPHYTON DENSITY ESTIMATES
AT EACH STATION SAMPLED IN 1981
STATION=YELLOW CREEK - 1

GENERAL LINEAR MODELS PROCEDURE

CLASS LEVEL INFORMATION

CLASS	LEVELS	VALUES
SEASON	3	FALL SPRING SUMMER

NUMBER OF OBSERVATIONS IN BY GROUP = 143

RIO BLANCO OIL SHALE COMPANY
AQUATIC ECOLOGY MONITORING PROGRAM

ONE-WAY MODEL I ANALYSIS OF VARIANCE
COMPARING PERIPHYTON DENSITY ESTIMATES
AT EACH STATION SAMPLED IN 1981
STATION=YELLOW CREEK - 1

GENERAL LINEAR MODELS PROCEDURE

DEPENDENT VARIABLE: DENSITY

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE
MODEL	2	47182.50499501	23591.25249750
ERROR	140	49855272.81746017	356109.09155329
CORRECTED TOTAL	142	49902455.32245518	

MODEL F =	0.07		PR > F = 0.9359

R-SQUARE	C.V.	STD DEV	DENSITY MEAN
0.000945	335.0854	596.74876753	178.08857809

SOURCE	DF	TYPE I SS	F VALUE	PR > F
SEASON	2	47182.50499500	0.07	0.9359

RIO BLANCO OIL SHALE COMPANY
AQUATIC ECOLOGY MONITORING PROGRAM

ONE-WAY MODEL I ANALYSIS OF VARIANCE
COMPARING PERIPHYTON DENSITY ESTIMATES
AT EACH STATION SAMPLED IN 1981
STATION=YELLOW CREEK - 2

GENERAL LINEAR MODELS PROCEDURE

CLASS LEVEL INFORMATION

CLASS	LEVELS	VALUES
SEASON	3	FALL SPRING SUMMER

NUMBER OF OBSERVATIONS IN BY GROUP = 154

RIO BLANCO OIL SHALE COMPANY
AQUATIC ECOLOGY MONITORING PROGRAM

ONE-WAY MODEL I ANALYSIS OF VARIANCE
COMPARING PERIPHYTON DENSITY ESTIMATES
AT EACH STATION SAMPLED IN 1981
STATION=YELLOW CREEK - 2

GENERAL LINEAR MODELS PROCEDURE

DEPENDENT VARIABLE: DENSITY

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE
MODEL	2	408475.99209302	204237.99604651
ERROR	151	51740586.05696897	342652.88779450
CORRECTED TOTAL	153	52149062.04906198	

MODEL F =	0.60		PR > F = 0.5523

R-SQUARE	C.V.	STD DEV	DENSITY MEAN
0.007833	401.2447	585.36560192	145.88744589

SOURCE	DF	TYPE I SS	F VALUE	PR > F
SEASON	2	408475.99209301	0.60	0.5523

RIO BLANCO OIL SHALE COMPANY
AQUATIC ECOLOGY MONITORING PROGRAM

ONE-WAY MODEL I ANALYSIS OF VARIANCE
COMPARING PERIPHYTON DENSITY ESTIMATES
AT EACH STATION SAMPLED IN 1981
STATION=YELLOW CREEK - 3

GENERAL LINEAR MODELS PROCEDURE

CLASS LEVEL INFORMATION

CLASS	LEVELS	VALUES
SEASON	3	FALL SPRING SUMMER

NUMBER OF OBSERVATIONS IN BY GROUP = 110

RIO BLANCO OIL SHALE COMPANY
AQUATIC ECOLOGY MONITORING PROGRAM

ONE-WAY MODEL I ANALYSIS OF VARIANCE
COMPARING PERIPHYTON DENSITY ESTIMATES
AT EACH STATION SAMPLED IN 1981
STATION=YELLOW CREEK - 3

GENERAL LINEAR MODELS PROCEDURE

DEPENDENT VARIABLE: DENSITY

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE
MODEL	2	110153.41321714	55076.70660857
ERROR	107	43183179.92011612	403581.12074875
CORRECTED TOTAL	109	43293333.33333326	

MODEL F = 0.14 PR > F = 0.8726

R-SQUARE	C.V.	STD DEV	DENSITY MEAN
0.002544	317.6402	635.28034815	200.00000000

SOURCE	DF	TYPE I SS	F VALUE	PR > F
SEASON	2	110153.41321714	0.14	0.8726

RIO BLANCO OIL SHALE COMPANY
AQUATIC ECOLOGY MONITORING PROGRAM

ONE-WAY MODEL I ANALYSIS OF VARIANCE
COMPARING PERIPHYTON DENSITY ESTIMATES
AT EACH STATION SAMPLED IN 1981
STATION=WHITE RIVER - 1

GENERAL LINEAR MODELS PROCEDURE

CLASS LEVEL INFORMATION

CLASS	LEVELS	VALUES
SEASON	3	FALL SPRING SUMMER

NUMBER OF OBSERVATIONS IN BY GROUP = 181

RIO BLANCO OIL SHALE COMPANY
AQUATIC ECOLOGY MONITORING PROGRAM

ONE-WAY MODEL I ANALYSIS OF VARIANCE
COMPARING PERIPHYTON DENSITY ESTIMATES
AT EACH STATION SAMPLED IN 1981
STATION=WHITE RIVER - 1

GENERAL LINEAR MODELS PROCEDURE

DEPENDENT VARIABLE: DENSITY

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE
MODEL	2	86006.63018468	43003.31509234
ERROR	178	40214263.47417373	225922.82850659
CORRECTED TOTAL	180	40300270.10435841	

MODEL F = 0.19 PR > F = 0.8268

R-SQUARE	C.V.	STD DEV	DENSITY MEAN
0.002134	311.7092	475.31340030	152.48618785

SOURCE	DF	TYPE I SS	F VALUE	PR > F
SEASON	2	86006.63018468	0.19	0.8268

RIO BLANCO OIL SHALE COMPANY
AQUATIC ECOLOGY MONITORING PROGRAM

ONE-WAY MODEL I ANALYSIS OF VARIANCE
COMPARING PERIPHYTON DENSITY ESTIMATES
AT EACH STATION SAMPLED IN 1981
STATION=WHITE RIVER - 2

GENERAL LINEAR MODELS PROCEDURE

CLASS LEVEL INFORMATION

CLASS	LEVELS	VALUES
SEASON	3	FALL SPRING SUMMER

NUMBER OF OBSERVATIONS IN BY GROUP = 170

RIO BLANCO OIL SHALE COMPANY
AQUATIC ECOLOGY MONITORING PROGRAM

ONE-WAY MODEL I ANALYSIS OF VARIANCE
COMPARING PERIPHYTON DENSITY ESTIMATES
AT EACH STATION SAMPLED IN 1981
STATION=WHITE RIVER - 2

GENERAL LINEAR MODELS PROCEDURE

DEPENDENT VARIABLE: DENSITY

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE
MODEL	2	21364.67065942	10682.33532971
ERROR	167	50991471.93064765	305338.15527334
CORRECTED TOTAL	169	51012836.60130707	

MODEL F =	0.03		PR > F = 0.9656

R-SQUARE	C.V.	STD DEV	DENSITY MEAN
0.000419	314.5232	552.57411745	175.68627451

SOURCE	DF	TYPE I SS	F VALUE	PR > F
SEASON	2	21364.67065942	0.03	0.9656

APPENDIX 4-2.6

Taxonomic Composition of Benthic Macroinvertebrates at Each Sampling Station for all Sampling Periods in 1981

BENTHOS SPECIES LIST

RIO BLANCO OIL SHALE COMPANY
TRACT C-A
1981

TAXON	STATION NUMBER CG-1	YC-1	YC-2	YC-3	WR-1	WR-2
PHYLUM NEMATODA		X			X	X
PHYLUM ANNELIDA						
CLASS OLIGOCHAETA						
ORDER HAPLOTAXIDA						
FAMILY HAPLOTAXIDAE						
HAPLOTAXIS GORDIOIDES	X					
FAMILY TUBIFICIDAE		X	X	X	X	X
FAMILY NAIDIDAE	X	X				
CLASS HIRUDINEA						
ORDER RHYNCHOBDELLIDA						
FAMILY GLOSSIPHONIIDAE						
HELOBDELLA STAGNALIS	X		X	X		
PHYLUM MOLLUSCA						
CLASS GASTROPODA						
ORDER BASSOMATOPHORA						
FAMILY LYMNAEIDAE						
LYMNAEA			X			
PHYLUM ARTHROPODA						
CLASS CRUSTACEA						
ORDER AMPHIPODA						
FAMILY TALITRIDAE						
HYALELLA AZTECA	X	X	X	X		
ORDER OSTRACODA						
SUBORDER PODOCOPA			X			
CLASS ARACHNIDA						
ORDER ACARINA				X		
CLASS INSECTA						
ORDER EPHEMEROPTERA						
FAMILY BAETIDAE						
BAETIS	X	X			X	X
CALLIBAETIS		X	X	X	X	
FAMILY CAENIDAE						
CAENIS			X			
FAMILY HEPTAGENIIDAE						
HEPTAGENIA					X	X
RHITHROGENA					X	X
FAMILY EPHEMERELLIDAE						
EPHEMERELLA (EPHEMERELLA)					X	X
EPHEMERELLA (SERRATELLA)	X				X	X
FAMILY LEPTOPHLEBIIDAE						
CHOROTERPES (CHOROTERPES)					X	X
TRAVERELLA					X	X
FAMILY TRICORYTHIDAE						
TRICORYTHODES				X	X	X
ORDER ODONATA						
FAMILY GOMPHIDAE						
OCTOGOMPHUS					X	
OPHIOGOMPHUS					X	
FAMILY COENAGRIONIDAE						
AMPHIAGRION		X	X	X		
ARGIA			X	X		X
ENALLAGMA		X	X	X		

ORDER PLECOPTERA						
FAMILY PERLIDAE						
CLAASSENIA SABULOSA						x
FAMILY PERLODIDAE						
ISOPERLA	x				x	x
ISOGENOIDES ELONGATUS					x	x
ORDER HEMIPTERA						
FAMILY CORIXIDAE						
SIGARA				x		
ORDER TRICHOPTERA						
FAMILY BRACHYCENTRIDAE						
BRACHYCENTRUS					x	x
FAMILY HYDROPSYCHIDAE						
CHEUMATOPSYCHE					x	x
HYDROPSYCHE		x		x	x	x
FAMILY HYDROPTILIDAE						
HYDROPTILA		x			x	
FAMILY LIMNEPHILIDAE						
LIMNEPHILUS			x			
ORDER LEPIDOPTERA						
FAMILY PYRALIDAE						
PARARGYRACTIS		x			x	x
ORDER COLEOPTERA						
FAMILY DRYOPIDAE						
HELICHUS			x			
FAMILY ELMIDAE						
OLBIRAPHIA					x	
HEXACYLLOEPUS FERRUGINEUS					x	x
OPTIOSERVUS						x
ZAITZEVIA PARVULA						x
FAMILY HYDROPHILIDAE						
TROPISTERNUS			x			
FAMILY HALIPLIDAE						
HALIPLUS		x				
FAMILY DYTISCIDAE						
AGABUS	x	x	x			
DERONECTES		x	x	x		
ORDER DIPTERA						
FAMILY CERATOPOGONIDAE						
SUBFAMILY CERATOPOGONINAE	x	x	x	x		x
FAMILY CHIRONOMIDAE						
SUBFAMILY TANYPODINAE						
TRIBE PENTANEURINI				x	x	
TRIBE MACROPELOPIINI	x	x	x	x	x	x
SUBFAMILY DIAMESINAE						
TRIBE DIAMESINI	x					x
TRIBE PRODIAMESINI					x	x
SUBFAMILY ORTHOCLADIINAE						
TRIBE CORYNONEURINI		x	x			x
TRIBES ORTHOCLADIINI AND METRIOCNE	x	x	x	x	x	x
SUBFAMILY CHIRONOMINAE						
TRIBE CHIRONOMINI	x	x	x	x	x	x
TRIBE TANYTARSINI		x	x	x	x	
FAMILY EPHYDRIDAE				x		
FAMILY EMPIDIDAE		x				
FAMILY SIMULIDAE						x
SIMULIUM		x	x	x	x	x
FAMILY MUSCIDAE	x	x				
FAMILY TABANIDAE						
CHRYSOPS			x	x		
TABANUS	x	x	x	x		
FAMILY TIPULIDAE						
HEXATOMA					x	x
TIPULA	x	x				

FAMILY STRATIOMYIDAE		
ELPARYPHUS		
STRATIOMYS	X	X

X = ORGANISM IDENTIFIED TO THIS TAXONOMIC LEVEL OBSERVED AT SAMPLING STATION

APPENDIX 4-2.7

Seasonal Changes in Benthic Macroinvertebrate Taxonomic Composition at Each Sampling Station in 1981

BENTHOS SPECIES LIST

RIO BLANCO OIL SHALE COMPANY
TRACT C-A

SPECIES OCCURRENCE BY SAMPLING DATE AT STATION CG-1
1981

TAXON	SAMPLING DATE APRIL	JULY	OCTOBER
PHYLUM ANNELIDA			
CLASS OLIGOCHAETA			
ORDER HAPLOTAXIDA			
FAMILY HAPLOTAXIDAE			
HAPLOTAXIS GORDIOIDES	X		X
FAMILY NAIDIDAE			X
CLASS HIRUDINEA			
ORDER RHYNCHOBDELLIDA			
FAMILY GLOSSIPHONIIDAE			
HELOBDELLA STAGNALIS			X
PHYLUM ARTHROPODA			
CLASS CRUSTACEA			
ORDER AMPHIPODA			
FAMILY TALITRIDAE			
HYALELLA AZTECA			X
CLASS INSECTA			
ORDER EPHEMEROPTERA			
FAMILY BAETIDAE			
BAETIS	X	X	
FAMILY EPHEMERELLIDAE			
EPHEMERELLA (SERRATELLA)			X
ORDER PLECOPTERA			
FAMILY PERLODIDAE			
ISOPERLA	X		
ORDER COLEOPTERA			
FAMILY DYTISCIDAE			
AGABUS	X		
ORDER DIPTERA			
FAMILY CERATOPOGONIDAE			
SUBFAMILY CERATOPOGONINAE	X		
FAMILY CHIRONOMIDAE			
SUBFAMILY TANYPODINAE			
TRIBE MACROPELOPIINI	X		
SUBFAMILY DIAMESINAE			
TRIBE DIAMESINI			X
SUBFAMILY ORTHOCLADIINAE			
TRIBES ORTHOCLADIINI AND METRIOCNE	X	X	X
SUBFAMILY CHIRONOMINAE			
TRIBE CHIRONOMINI		X	
FAMILY MUSCIDAE	X		X
FAMILY TABANIDAE			
TABANUS	X		
FAMILY TIPULIDAE			
TIPULA	X		
FAMILY STRATIOMYIDAE			
STRATIOMYS		X	

X = ORGANISM IDENTIFIED TO THIS TAXONOMIC LEVEL OBSERVED AT SAMPLING STATION

BENTHOS SPECIES LIST

RIO BLANCO OIL SHALE COMPANY
TRACT C-A

SPECIES OCCURRENCE BY SAMPLING DATE AT STATION YC-1
1981

TAXON	SAMPLING DATE APRIL	JULY	OCTOBER
PHYLUM NEMATODA	X		
PHYLUM ANNELIDA			
CLASS OLIGOCHAETA			
ORDER HAPLOTAXIDA			
FAMILY TUBIFICIDAE	X		X
FAMILY NAIDIDAE	X		
PHYLUM ARTHROPODA			
CLASS CRUSTACEA			
ORDER AMPHIPODA			
FAMILY TALITRIDAE			
HYALELLA AZTECA			X
CLASS INSECTA			
ORDER EPHEMEROPTERA			
FAMILY BAETIDAE			
BAETIS	X		
CALLIBAETIS		X	X
ORDER CODNATA			
FAMILY COENAGRIONIDAE			
AMPHIAGRION			X
ENALLAGMA			X
ORDER TRICHOPTERA			
FAMILY HYDROPSYCHIDAE			
HYDROPSYCHE			X
FAMILY HYDROPTILIDAE			
HYDROPTILA	X		X
ORDER LEPIDOPTERA			
FAMILY PYRALIDAE			
PARARGYRACTIS			X
ORDER COLEOPTERA			
FAMILY HALIPLIDAE			
HALIPLUS		X	
FAMILY DYTISCIDAE			
AGABUS	X		
DERONECTES	X		
ORDER DIPTERA			
FAMILY CERATOPOGONIDAE			
SUBFAMILY CERATOPOGONINAE	X		X
FAMILY CHIRONOMIDAE			
SUBFAMILY TANYPODINAE			
TRIBE MACROPELOPIINI	X		X
SUBFAMILY ORTHOCLADIINAE			
TRIBE CORYNONEURINI			X
TRIBES ORTHOCLADIINI AND METRIOCNE	X	X	X
SUBFAMILY CHIRONOMINAE			
TRIBE CHIRONOMINI	X		X
TRIBE TANYTARSINI			X
FAMILY EMPIDIDAE	X		
FAMILY SIMULIDAE			
SIMULIUM	X	X	X
FAMILY MUSCIDAE			X

FAMILY TABANIDAE		
TABANUS	X	X
FAMILY TIPULIDAE		
TIPULA	X	

X = ORGANISM IDENTIFIED TO THIS TAXONOMIC LEVEL OBSERVED AT SAMPLING STATION

BENTHOS SPECIES LIST

RIO BLANCO OIL SHALE COMPANY
TRACT C-A

SPECIES OCCURRENCE BY SAMPLING DATE AT STATION YC-2
1981

TAXON	SAMPLING DATE APRIL	JULY	OCTOBER
PHYLUM ANNELIDA			
CLASS OLIGOCHAETA			
ORDER HAPLOTAXIDA			
FAMILY TUBIFICIDAE	X	X	X
CLASS HIRUDINEA			
ORDER RHYNCHOBDELLIDA			
FAMILY GLOSSIPHONIIDAE			
HELOPDELLA STAGNALIS	X	X	X
PHYLUM MOLLUSCA			
CLASS GASTROPODA			
ORDER BASSOMATOPHORA			
FAMILY LYMNAEIDAE			
LYMNAEA	X	X	X
PHYLUM ARTHROPODA			
CLASS CRUSTACEA			
ORDER AMPHIPODA			
FAMILY TALITRIDAE			
HYALELLA AZTECA	X	X	X
ORDER OSTRACODA			
SUBORDER PODOCOPA			X
CLASS INSECTA			
ORDER EPHEMEROPTERA			
FAMILY BAETIDAE			
CALLIBAETIS		X	X
FAMILY CAENIDAE			
CAENIS		X	
ORDER ODONATA			
FAMILY COENAGRIONIDAE			
AMPHIAGRION	X	X	X
ARGIA			X
ENALLAGMA			X
ORDER TRICHOPTERA			
FAMILY LIMNEPHILIDAE			
LIMNEPHILUS			X
ORDER COLEOPTERA			
FAMILY DRYOPIDAE			
HELICHUS	X		X
FAMILY HYDROPHILIDAE			
TROPISTERNUS		X	
FAMILY DYTISCIDAE			
AGABUS	X		
DERONECTES	X	X	X
ORDER DIPTERA			
FAMILY CERATOPOGONIDAE			
SUBFAMILY CERATOPOGONINAE	X	X	
FAMILY CHIRONOMIDAE			
SUBFAMILY TANYPODINAE			
TRIBE MACROPELOPIINI	X		
SUBFAMILY ORTHOCLADIINAE			
TRIBE CORYNONEURINI			X

TRIBES ORTHOCLADIINI AND METRIOCNE	X	X	X
SUBFAMILY CHIRONOMINAE			
TRIBE CHIRONOMINI	X		X
TRIBE TANYTARSINI		X	X
FAMILY SIMULIDAE			
SIMULIUM	X		X
FAMILY TABANIDAE			
CHRYSOPS		X	
TABANUS			X
FAMILY STRATIOMYIDAE			
EUPARYPHUS	X		

X = ORGANISM IDENTIFIED TO THIS TAXONOMIC LEVEL OBSERVED AT SAMPLING STATION

BENTHOS SPECIES LIST

RIO BLANCO OIL SHALE COMPANY
TRACT C-A

SPECIES OCCURRENCE BY SAMPLING DATE AT STATION YC-3
1981

TAXON	SAMPLING DATE APRIL	JULY	OCTOBER
PHYLUM ANNELIDA			
CLASS OLIGOCHAETA			
ORDER HAPLOTAXIDA			
FAMILY TUBIFICIDAE	X	X	X
CLASS HIRUDINEA			
ORDER RHYNCHOBDELLIDA			
FAMILY GLOSSIPHONIIDAE			
HELOBDELLA STAGNALIS		X	
PHYLUM ARTHROPODA			
CLASS CRUSTACEA			
ORDER AMPHIPODA			
FAMILY TALITRIDAE			
HYALELLA AZTECA		X	
CLASS ARACHNIDA			
ORDER ACARINA	X	X	
CLASS INSECTA			
ORDER EPHEMEROPTERA			
FAMILY BAETIDAE			
CALLIBAETIS		X	X
FAMILY TRICORYTHIDAE			
TRICORYTHODES			X
ORDER ODONATA			
FAMILY COENAGRIONIDAE			
AMPHIAGRION	X	X	X
ARGIA			X
ENALLAGMA			X
ORDER HEMIPTERA			
FAMILY CORIXIDAE			
SIGARA			X
ORDER TRICHOPTERA			
FAMILY HYDROPSYCHIDAE			
HYDROPSYCHE	X	X	
ORDER COLEOPTERA			
FAMILY DYTISCIDAE			
OERONECTES		X	X
ORDER DIPTERA			
FAMILY CERATOPOGONIDAE			
SUBFAMILY CERATOPOGONINAE	X		X
FAMILY CHIRONOMIDAE			
SUBFAMILY TANYPODINAE			
TRIBE PENTANEURINI	X		
TRIBE MACROPLEOPIINI	X	X	
SUBFAMILY ORTHOCLADIINAE			
TRIBES ORTHOCLADIINI AND METRIOCNE	X	X	X
SUBFAMILY CHIRONOMINAE			
TRIBE CHIRONOMINI			X
TRIBE TANYTARSINI	X		X
FAMILY EPHYDRIDAE	X		
FAMILY SIMULIDAE			
SIMULIUM		X	X

FAMILY TABANIDAE			
CHRYSOPS	X		
TABANUS		X	X

X = ORGANISM IDENTIFIED TO THIS TAXONOMIC LEVEL OBSERVED AT SAMPLING STATION

BENTHOS SPECIES LIST

RIO BLANCO OIL SHALE COMPANY
TRACT C-A

SPECIES OCCURRENCE BY SAMPLING DATE AT STATION WR-1
1981

TAXON	SAMPLING DATE APRIL	JULY	OCTOBER
PHYLUM NEMATODA	X		
PHYLUM ANNELIDA			
CLASS OLIGOCHAETA			
ORDER HAPLOTAXIDA			
FAMILY TUBIFICIDAE	X	X	X
PHYLUM ARTHROPODA			
CLASS INSECTA			
ORDER EPHEMEROPTERA			
FAMILY BAETIDAE			
BAETIS	X	X	X
CALLIBAETIS		X	
FAMILY HEPTAGENIIDAE			
HEPTAGENIA	X		
RHITHROGENA	X		X
FAMILY EPHEMERELLIDAE			
EPHEMERELLA (EPHEMERELLA)	X		
EPHEMERELLA (SERRATELLA)		X	
FAMILY LEPTOPHLEBIIDAE			
CHOROTERPES (CHOROTERPES)		X	
TRAVERELLA		X	
FAMILY TRICORYTHIDAE			
TRICORYTHODES		X	X
ORDER ODONATA			
FAMILY GOMPHIDAE			
OCTOGOMPHUS		X	
OPHIOGOMPHUS	X		X
ORDER PLECOPTERA			
FAMILY PERLODIDAE			
ISOPERLA	X		
ISOGENOIDES ELONGATUS	X		X
ORDER TRICHOPTERA			
FAMILY BRACHYCENTRIDAE			
BRACHYCENTRUS		X	X
FAMILY HYDROPSYCHIDAE			
CHEUMATOPSYCHE		X	X
HYDROPSYCHE	X	X	X
FAMILY HYDROPTILIDAE			
HYDROPTILA		X	
ORDER LEPIDOPTERA			
FAMILY PYRALIDAE			
PARAPGYRACTIS		X	X
ORDER COLEOPTERA			
FAMILY ELMIDAE			
CURIARAPHIA	X		
HEXACYLLOEPUS FERRUGINEUS			X
ORDER DIPTERA			
FAMILY CHIRONOMIDAE			
SUBFAMILY TANYPODINAE			
TRIBE PENTANEURINI			X
TRIBE MACROPELOPIINI			X

SUBFAMILY DIAMESINAE			
TRIBE PRODIAMESINI	X		
SUBFAMILY ORTHOCLADIINAE			
TRIBES ORTHOCLADIINI AND METRIOCNE	X	X	X
SUBFAMILY CHIRONOMINAE			
TRIBE CHIRONOMINI	X	X	X
TRIBE TANYTARSINI	X		X
FAMILY SIMULIDAE			
SIMULIUM			X
FAMILY TIPULIDAE			
HEXATOMA			X

X = ORGANISM IDENTIFIED TO THIS TAXONOMIC LEVEL OBSERVED AT SAMPLING STATION

BENTHOS SPECIES LIST

RIO BLANCO OIL SHALE COMPANY
TRACT C-A

SPECIES OCCURRENCE BY SAMPLING DATE AT STATION WR-2
1981

TAXON	SAMPLING DATE APRIL	JULY	OCTOBER
PHYLUM NEMATODA		X	
PHYLUM ANNELIDA			
CLASS OLIGOCHAETA			
ORDER HAPLOTAXIDA			
FAMILY TUBIFICIDAE	X	X	X
PHYLUM ARTHROPODA			
CLASS INSECTA			
ORDER EPHEMEROPTERA			
FAMILY BAETIDAE			
BAETIS	X	X	X
FAMILY HEPTAGENIIDAE			
HEPTAGENIA		X	X
RHITHROGENA	X	X	X
FAMILY EPHEMERELLIDAE			
EPHEMERELLA (EPHEMERELLA)	X		
EPHEMERELLA (SERRATELLA)		X	X
FAMILY LEPTOPHLEBIIDAE			
CHOROTERPES (CHOROTERPES)		X	
TRAVERELLA		X	X
FAMILY TRICORYTHIDAE			
TRICORYTHODES		X	X
ORDER ODONATA			
FAMILY COENAGRIONIDAE			
ARGIA			X
ORDER PLECOPTERA			
FAMILY PERLIDAE			
CLAASSENIA SABULOSA			X
FAMILY PERLODIDAE			
ISOPERLA	X		X
ISOGENOIDES ELONGATUS		X	X
ORDER TRICHOPTERA			
FAMILY BRACHYCENTRIDAE			
BRACHYCENTRUS		X	X
FAMILY HYDROPSYCHIDAE			
CHEUMATOPSYCHE	X	X	X
HYDROPSYCHE	X	X	X
ORDER LEPIDOPTERA			
FAMILY PYRALIDAE			
PARAPONYRACTIS	X	X	X
ORDER COLEOPTERA			
FAMILY ELMIDAE			
HEXACYLLOEPUS FERRUGINEUS			X
OPTIOSERVUS			X
ZAITZEVIA PARVULA			X
ORDER DIPTERA			
FAMILY CERATOPOGONIDAE			
SUBFAMILY CERATOPOGONINAE	X		
FAMILY CHIRONOMIDAE			
SUBFAMILY TANYPODINAE			
TRIBE MACROPELOPIINI			X

SUBFAMILY DIAMESINAE			
TRIBE DIAMESINI		X	
TRIBE PRODIAMESINI	X		
SUBFAMILY ORTHOCLADIINAE			
TRIBE CORYNONEURINI	X		
TRIBES ORTHOCLADIINI AND METRIOCNE	X	X	
SUBFAMILY CHIRONOMINAE			
TRIBE CHIRONOMINI	X	X	X
FAMILY SIMULIDAE	X		
SIMULIUM		X	X
FAMILY TIPULIDAE			
HEXATOMA	X	X	X

X = ORGANISM IDENTIFIED TO THIS TAXONOMIC LEVEL OBSERVED AT SAMPLING STATION

APPENDIX 4-2.8

Benthic Macroinvertebrate Enumeration Data for all Stations by Sampling Date for 1981

BENTHOS DATA SHEET

RIO BLANCO OIL SHALE COMPANY
TRACT C-A

SAMPLE SITE: CG-1 CORRAL GULCH

SAMPLE DATE - 042681
NUMBER OF REPLICATES - 3
SAMPLER SIZE - 522.0 CM2

CODE	TAXON	REPLICATE DESIGNATION A	B	C
ISOP	ISOPERLA	2	0	0
BAET	BAETIS	1	2	1
TABS	TABANUS	1	0	0
CERE	SUBFAMILY CERATOPOGONINAE	1	0	0
TIPA	TIPULA	1	0	1
AGAB	AGABUS	1	0	1
MUSC	FAMILY MUSCIDAE	1	0	1
HAGO	HAPLOTAXIS GORDIOIDES	0	0	3
TROM	TRIBES ORTHOCLADIINI AND METRIOCNEMIINI	11	3	5
MACR	TRIBE MACROPLEOPIINI	0	1	0

SAMPLE SITE: YC-1 YELLOW CREEK

SAMPLE DATE - 042881
NUMBER OF REPLICATES - 3
SAMPLER SIZE - 522.0 CM2

CODE	TAXON	REPLICATE DESIGNATION A	B	C
TROM	TRIBES ORTHOCLADIINI AND METRIOCNEMIINI	14	5	7
TIPA	TIPULA	1	0	1
NAID	FAMILY NAIDIDAE	9	15	14
TUBY	FAMILY TUBIFICIDAE	11	16	19
BAET	BAETIS	3	7	10
AGAB	AGABUS	7	7	23
CHIT	TRIBE CHIRONOMINI	1	0	0
SIML	SIMULIUM	22	38	30
MACR	TRIBE MACROPLEOPIINI	26	21	54
EMPP	FAMILY EMPIDIDAE	20	15	29
NEMA	PHYLUM NEMATODA	1	2	0
OERO	OERONECTES	0	1	0
CERE	SUBFAMILY CERATOPOGONINAE	0	1	1
HYTL	HYDROPTILA	0	0	1
TABS	TABANUS	0	0	1

SAMPLE SITE: YC-2 YELLOW CREEK

SAMPLE DATE - 042881
NUMBER OF REPLICATES - 3
SAMPLER SIZE - 522.0 CM2

CODE	TAXON	REPLICATE DESIGNATION A	B	C
TROM	TRIBES ORTHOCLADIINI AND METRIOCNEMIINI	2	1	0
TUBY	FAMILY TUBIFICIDAE	41	82	108
HYAZ	HYALELLA AZTECA	17	19	32
HEST	HELOBDELLA STAGNALIS	12	45	0
LYMN	LYMNAEA	3	0	9
MACR	TRIBE MACROPLEOPIINI	0	1	2
SIML	SIMULIUM	3	17	16
CHIT	TRIBE CHIRONOMINI	0	1	0
CERE	SUBFAMILY CERATOPOGONINAE	1	5	0
AMPG	AMPHIAGRION	2	0	1
OERU	DERONECTES	4	0	0
AGAB	AGABUS	0	1	0
HELI	HELICHUS	0	1	0
EUPA	EUPARYPHUS	0	0	1

SAMPLE SITE: YC-3 YELLOW CREEK

SAMPLE DATE - 042981
NUMBER OF REPLICATES - 3
SAMPLER SIZE - 522.0 CM2

CODE	TAXON	REPLICATE DESIGNATION A	B	C
TROM	TRIBES ORTHOCLADIINI AND METRIOCNEMIINI	51	54	68
ACAR	ACARINA	1	0	0
CERE	SUBFAMILY CERATOPOGONINAE	11	2	6
HYSP	HYDROPSYCHE	1	0	0
TUBY	FAMILY TUBIFICIDAE	2	2	2
EPHY	FAMILY EPHYDRIDAE	0	1	0
CHOP	CHRYSOPS	0	0	2
AMPG	AMPHIAGRION	0	0	1
TANT	TRIBE TANYTARSINI	0	5	2
MACR	TRIBE MACROPLEOPIINI	0	0	1
PENI	TRIBE PENTANEURINI	0	0	1

SAMPLE SITE: WR-1 WHITE RIVER

SAMPLE DATE - 042981
NUMBER OF REPLICATES - 3

SAMPLER SIZE - 522.0 CM2

CODE	TAXON	REPLICATE DESIGNATION A	B	C
CHIT	TRIBE CHIRONOMINI	35	1	21
TUBY	FAMILY TUBIFICIDAE	23	7	152
BAET	BAETIS	7	1	2
HYSP	HYDROPSYCHE	9	0	3
EPEP	EPHEMERELLA (EPHEMERELLA)	32	24	8
ISOP	ISOPERLA	3	17	0
OGMP	OPHIOGOMPHUS	0	1	0
NEMA	PHYLUM NEMATODA	0	1	0
RHIT	RHITHROGENA	0	1	0
HEPP	HEPTAGENIA	0	3	0
ISOG	ISOGENOIDES ELONGATUS	0	1	0
OUBS	OUBIRAPHIA	0	0	1
TANT	TRIBE TANYTARSINI	2	0	1
TROM	TRIBES ORTHOCLADIINI AND METRIOCNEMIINI	5	0	1
PROD	TRIBE PRODIAMESINI	17	0	12

SAMPLE SITE: WR-2 WHITE RIVER

SAMPLE DATE - 042981
NUMBER OF REPLICATES - 3
SAMPLER SIZE - 522.0 CM2

CODE	TAXON	REPLICATE DESIGNATION A	B	C
CHIT	TRIBE CHIRONOMINI	2	1	2
TUBY	FAMILY TUBIFICIDAE	60	7	2
BAET	BAETIS	8	9	7
EPEP	EPHEMERELLA (EPHEMERELLA)	17	22	29
HYSP	HYDROPSYCHE	7	44	54
CERE	SUBFAMILY CERATOPOGONINAE	1	0	0
RHIT	RHITHROGENA	2	0	0
ISOP	ISOPERLA	8	3	2
SIMF	FAMILY SIMULIDAE	0	1	0
TIPS	HEXATOMA	0	1	9
CHEU	CHEUMATOPSYCHE	0	0	1
TROM	TRIBES ORTHOCLADIINI AND METRIOCNEMIINI	1	0	4
CORY	TRIBE CORYNONEURINI	0	1	0
PROD	TRIBE PRODIAMESINI	1	0	1
PRAR	PARARGYRACTIS	0	0	2

BENTHOS DATA SHEET

RIO BLANCO OIL SHALE COMPANY
TRACT C-A

SAMPLE SITE: CG-1 CORRAL GULCH

SAMPLE DATE - D72081
NUMBER OF REPLICATES - 3
SAMPLER SIZE - 522.0 CM2

CODE	TAXON	REPLICATE DESIGNATION A	B	C
BAET	BAETIS	3	0	0
STRA	STRATIOMYS	1	0	0
TRON	TRIBES ORTHOCLADIINI AND METRIOCNEMIINI	1	0	0
CHIT	TRIBE CHIRONOMINI	1	0	0

SAMPLE SITE: YC-1 YELLOW CREEK

SAMPLE DATE - D72081
NUMBER OF REPLICATES - 3
SAMPLER SIZE - 522.0 CM2

CODE	TAXON	REPLICATE DESIGNATION A	B	C
CALL	CALLIBAETIS	1	1	0
SIML	SIMULIUM	0	1	0
HALP	HALIPLUS	0	1	0
TRON	TRIBES ORTHOCLADIINI AND METRIOCNEMIINI	0	0	1

SAMPLE SITE: YC-2 YELLOW CREEK

SAMPLE DATE - D72081
NUMBER OF REPLICATES - 3
SAMPLER SIZE - 522.0 CM2

CODE	TAXON	REPLICATE DESIGNATION A	B	C
CALL	CALLIBAETIS	17	2	18
AMPG	AMPHIAGRION	4	2	4
HEST	HELOBDELLA STAGNALIS	8	4	7
LYMN	LYMNAEA	21	1	11

CODE	TAXON	REPLICATE DESIGNATION A	B	C
CAEI	CAENIS	1	0	0
HYAZ	HYALELLA AZTECA	220	66	331
DERO	DERONECTES	1	1	0
TROP	TROPISTERNUS	0	3	0
CHOP	CHRYSOPS	0	1	0
TANT	TRIBE TANYTARSINI	6	1	1
TROM	TRIBES ORTHOCLADIINI AND METRIOCNEMIINI	4	2	2
CERE	SUBFAMILY CERATOPOGONINAE	1	0	0
TUBY	FAMILY TUBIFICIDAE	25	17	15

SAMPLE SITE: YC-3 YELLOW CREEK

SAMPLE DATE - 072081
NUMBER OF REPLICATES - 3
SAMPLER SIZE - 522.0 CM2

CODE	TAXON	REPLICATE DESIGNATION A	B	C
CALL	CALLIBAETIS	5	0	2
HYSP	HYDROPSYCHE	1	0	0
TABS	TABANUS	1	0	0
SIML	SIMULIUM	176	6	78
ACAR	ACARINA	1	0	0
AMPG	AMPHIAGRION	0	0	1
HYAZ	HYALELLA AZTECA	0	0	2
DERO	DERONECTES	0	0	2
HEST	HELOBDELLA STAGNALIS	0	0	4
MACR	TRIBE MACROPLEOPIINI	0	0	2
TROM	TRIBES ORTHOCLADIINI AND METRIOCNEMIINI	2	0	0
TUBY	FAMILY TUBIFICIDAE	19	62	4

SAMPLE SITE: WR-1 WHITE RIVER

SAMPLE DATE - 072081
NUMBER OF REPLICATES - 3
SAMPLER SIZE - 522.0 CM2

CODE	TAXON	REPLICATE DESIGNATION A	B	C
TRIC	TRICORYTHODES	301	284	143
HYSP	HYDROPSYCHE	7	5	0
BAET	BAETIS	7	5	2
BRAS	BRACHYCENTRUS	1	0	0
PRAR	PARARGYRACTIS	1	0	0
TRAV	TRAVERSELLA	4	2	0
CHCH	CHOROTERPES (CHOROTERPES)	1	11	0
EPSE	EPHEMERELLA (SERRATELLA)	1	1	2
HYTL	HYDROPTILA	1	1	0

CALL	CALLIBAETIS	0	1	0
OCTO	OCIOGOMPHUS	0	1	0
TROM	TRIBES ORTHOCLADIINI AND METRICCNEMIINI	4	1	1
CHIT	TRIBE CHIRONOMINI	16	13	12
TUBY	FAMILY TURIFICIDAE	0	2	4
CHEU	CHEUMATOPSYCHE	1	0	0

SAMPLE SITE: WR-2 WHITE RIVER

SAMPLE DATE - 072081
NUMBER OF REPLICATES - 3
SAMPLER SIZE - 522.0 CM2

		REPLICATE DESIGNATION		
CODE	TAXON	A	B	C
HYSP	HYDROPSYCHE	4	18	24
TRIC	TRICORYTHODES	140	112	132
NEMA	PHYLUM NEMATODA	1	0	0
HEPT	HEPTAGENIA	5	2	3
BAET	BAETIS	4	4	9
EPSE	EPHEMERELLA (SERRATELLA)	3	2	3
RHIT	RHITHROGENA	8	4	5
TRAV	TRAVERELLA	3	16	1
CHCH	CHORDTERPES (CHOROTERPES)	10	11	9
BRAS	BRACHYCENTRUS	0	2	0
SIML	SIMULIUM	1	0	8
TIPS	HEXATOMA	0	0	1
PRAR	PARARCYRACTIS	1	0	3
ISOG	ISOGENOIDES ELONGATUS	0	1	0
TROM	TRIBES ORTHOCLADIINI AND METRIOCNEMIINI	16	6	40
CHIT	TRIBE CHIRONOMINI	1	1	5
DIAS	TRIBE DIAMESINI	1	0	0
TUBY	FAMILY TUBIFICIDAE	0	0	2
CHEU	CHEUMATOPSYCHE	0	2	4

BENTHOS DATA SHEET

RIO BLANCO OIL SHALE COMPANY
TRACT C-A

SAMPLE SITE: CG-1 CORRAL GULCH

SAMPLE DATE - 100981
NUMBER OF REPLICATES - 3
SAMPLER SIZE - 522.0 CM2

CODE	TAXON	REPLICATE DESIGNATION A	B	C
HYAZ	HYALELLA AZTECA	3	18	4
TRDM	TRIBES ORTHOCLADIINI AND METRIOCNEMIINI	2	0	0
HEST	HELORDELLA STAGNALIS	0	4	0
MUSC	FAMILY MUSCIDAE	0	0	1
DIAS	TRIBE DIAMESINI	0	0	1
EPSE	EPHEMERELLA (SERRATELLA)	0	0	1
HAGO	HAPLOTAXIS GORDIOIDES	0	0	1
NAID	FAMILY NAIDIDAE	0	0	4

SAMPLE SITE: YC-1 YELLOW CREEK

SAMPLE DATE - 100981
NUMBER OF REPLICATES - 3
SAMPLER SIZE - 522.0 CM2

CODE	TAXON	REPLICATE DESIGNATION A	B	C
SIML	SIMULIUM	50	174	503
PRAR	PARARGYRACTIS	1	0	0
AMPG	AMPHIAGRION	2	0	0
TRDM	TRIBES ORTHOCLADIINI AND METRIOCNEMIINI	10	17	16
MACR	TRIBE MACROPLEDPIINI	7	10	1
CALL	CALLIBAETIS	24	10	7
MUSC	FAMILY MUSCIDAE	2	3	1
TANT	TRIBE TANYTARSINI	9	11	9
CHIT	TRIBE CHIRONOMINI	1	2	3
CORY	TRIBE CORYNONEURINI	1	3	3
ENAL	ENALLAGMA	1	1	0
HYAZ	HYALELLA AZTECA	0	1	1
HYTL	HYDROPTILA	0	3	0
TABS	TABANUS	0	1	0
CERE	SUBFAMILY CERATOPOGONINAE	0	0	1
HYSP	HYDROPSYCHE	0	0	1
TUBY	FAMILY TUBIFICIDAE	4	6	12

SAMPLE SITE: YC-2 YELLOW CREEK

SAMPLE DATE - 100981
NUMBER OF REPLICATES - 3
SAMPLER SIZE - 522.0 CM2

CODE	TAXON	REPLICATE DESIGNATION A	B	C
HYAZ	HYALELLA AZTECA	190	414	665
HEST	HELOBDELLA STAGNALIS	14	58	19
SIML	SIMULIUM	6	63	99
TABS	TABANUS	1	0	1
TANT	TRIBE TANYTARSINI	2	46	9
LYMN	LYMNAEA	4	66	13
TROM	TRIBES ORTHOCLADIINI AND METRIOCNEMIINI	7	0	13
CHIT	TRIBE CHIRONOMINI	1	1	3
CALL	CALLIBAETIS	4	10	5
ENAL	ENALLAGMA	2	1	0
ARGI	ARGIA	1	0	0
DERO	DERONECTES	2	6	4
HELI	HELICHUS	1	0	4
CORY	TRIBE CORYNONEURINI	0	1	0
AMPG	AMPHIAGRION	0	3	1
LIMS	LIMNEPHILUS	0	1	0
PODC	SUBORDER PODOCOPA	0	0	1
TUBY	FAMILY TUBIFICIDAE	4	136	23

SAMPLE SITE: YC-3 YELLOW CREEK

SAMPLE DATE - 100981
NUMBER OF REPLICATES - 3
SAMPLER SIZE - 522.0 CM2

CODE	TAXON	REPLICATE DESIGNATION A	B	C
TABS	TABANUS	2	0	0
SIML	SIMULIUM	1	2	2
CHIT	TRIBE CHIRONOMINI	1	1	0
CALL	CALLIBAETIS	2	4	2
DERO	DERONECTES	2	0	0
TROM	TRIBES ORTHOCLADIINI AND METRIOCNEMIINI	1	7	4
AMPG	AMPHIAGRION	7	1	2
ENAL	ENALLAGMA	9	3	1
ARGI	ARGIA	7	9	9
CERE	SUBFAMILY CERATOPOGONINAE	0	2	0
TANT	TRIBE TANYTARSINI	0	3	0
SIGA	SIGARA	0	1	1
TRIC	TRICORYTHODES	0	0	2
TUBY	FAMILY TUBIFICIDAE	40	60	41

SAMPLE SITE: WR-1 WHITE RIVER

SAMPLE DATE - 100981
NUMBER OF REPLICATES - 3
SAMPLER SIZE - 522.0 CM2

CODE	TAXON	REPLICATE DESIGNATION A	B	C
HYSP	HYDROPSYCHE	74	2	6
HEFE	HEXACYLLOEPUS FERRUGINEUS	6	2	2
BAET	BAETIS	11	8	9
TRIC	TRICORYTHODES	5	5	3
CHIT	TRIBE CHIRONOMINI	66	40	58
PRAR	PARARGYRACTIS	2	0	1
RHIT	RHITHROGENA	1	0	2
CHEU	CHEUMATOPSYCHE	8	0	1
MACR	TRIBE MACROPLEOPIINI	13	0	2
OGMP	OPHIOGOMPHUS	1	0	0
TIPS	HEXATOMA	6	0	0
BRAS	BRACHYCENTRUS	5	0	0
SIML	SIMULIUM	1	0	0
TRUM	TRIBES ORTHOCLADIINI AND METRIOCNEMIINI	3	0	0
TANT	TRIBE TANYTARSINI	1	0	0
PENT	TRIBE PENTANEURINI	1	0	0
ISOG	ISOGENOIDES ELONGATUS	1	0	0
TUBY	FAMILY TUBIFICIDAE	20	17	17

SAMPLE SITE: WR-2 WHITE RIVER

SAMPLE DATE - 100981
NUMBER OF REPLICATES - 3
SAMPLER SIZE - 522.0 CM2

CODE	TAXON	REPLICATE DESIGNATION A	B	C
BRAS	BRACHYCENTRUS	2	1	8
PRAR	PARARGYRACTIS	6	2	8
HYSP	HYDROPSYCHE	56	50	90
CHEU	CHEUMATOPSYCHE	19	13	15
TIPS	HEXATOMA	3	1	2
BAET	BAETIS	10	9	20
TRIC	TRICORYTHODES	5	2	17
CHIT	TRIBE CHIRONOMINI	4	1	7
HEPP	HEPTAGENIA	1	0	1
RHIT	RHITHROGENA	3	0	12
EPSE	EPHEMERELLA (SERRATELLA)	3	0	13
ZAPA	ZAITZEVIA PARVULA	1	0	0
ISOG	ISOGENOIDES ELONGATUS	1	0	1
ISOP	ISOPERLA	0	2	5

OPTI	OPTIOSERVUS	0	1	0
HEFE	HEXACYLLOEPUS FERRUGINEUS	0	3	4
TUBY	FAMILY TUBIFICIDAE	4	2	10
SIML	SIMULIUM	0	0	3
MACR	TRIBE MACROPLEOPIINI	0	0	2
ARGI	ARGIA	0	0	1
TRAV	TRAVERELLA	0	0	1
CLAA	CLAASSENIA SABLUOSA	0	0	1

APPENDIX 4-2.9

Benthic Macroinvertebrate Density and Diversity Calculations
for all Stations by Sampling Date for 1981

BENTHOS (MACROINVERTEBRATES) DENSITY AND DIVERSITY CALCULATIONS

RIO BLANCO OIL SHALE COMPANY
TRACT C-A
042681

STATION NUMBER - CG-1 CORRAL GULCH
NUMBER OF REPLICATES - 3
SAMPLE DATE - 042681

TAXON	DENSITY(#/M2) REP 1	REP 2	REP 3	MEAN	S.D.	PERCENT RELATIVE ABUNDANCE
PHYLUM ANNELIDA						
CLASS OLIGOCHAETA						
ORDER HAPLOTAXIDA						
FAMILY HAPLOTAXIDAE						
HAPLOTAXIS GORDIOIDES	.0	.0	57.5	19.2	33.2	8.1
PHYLUM ARTHROPODA						
CLASS INSECTA						
ORDER EPHEMEROPTERA						
FAMILY BAETIDAE						
BAETIS	19.2	38.3	19.2	25.5	11.1	10.8
ORDER PLECOPTERA						
FAMILY PERLODIDAE						
ISOPERLA	38.3	.0	.0	12.8	22.1	5.4
ORDER COLEOPTERA						
FAMILY DYTISCIDAE						
AGABUS	19.2	.0	19.2	12.8	11.1	5.4
ORDER DIPTERA						
FAMILY CERATOPOGONIDAE						
SUBFAMILY CERATOPOGONINAE	19.2	.0	.0	6.4	11.1	2.7
FAMILY CHIRONOMIDAE						
SUBFAMILY TANYPODINAE						
TRIBE MACROPELOPIINI	.0	19.2	.0	6.4	11.1	2.7
SUBFAMILY ORTHOCLADIINAE						
TRIBES ORTHOCLADIINI AND METRIOCNEMIINI	210.7	57.5	95.8	121.3	79.8	51.4
FAMILY MUSCIDAE	19.2	.0	19.2	12.8	11.1	5.4
FAMILY TABANIDAE						
TABANUS	19.2	.0	.0	6.4	11.1	2.7
FAMILY TIPULIDAE						
TIPULA	19.2	.0	19.2	12.8	11.1	5.4
TOTAL	364.0	114.9	229.9	236.3	124.6	100.0

DIVERSITY INDEX CALCULATIONS

SHANNON INDEX - 1.710
VARIANCE - .0053
MAXIMUM INDEX - 2.303
EVENNESS - .743
NO OF TAXA - 10

STATION NUMBER - YC-1 YELLOW CREEK
NUMBER OF REPLICATES - 3
SAMPLE DATE - 042881

TAXON	DENSITY(#/M2) REP 1	REP 2	REP 3	MEAN	S.D.	PERCENT RELATIVE ABUNDANCE
PHYLUM NEMATODA	19.2	38.3	.0	19.2	19.2	.7
PHYLUM ANNELIDA						
CLASS OLIGOCHAETA						
ORDER HAPLOTAXIDA						
FAMILY TUBIFICIDAE	210.7	306.5	364.0	293.7	77.4	10.6
FAMILY NAIDIDAE	172.4	287.4	268.2	242.7	61.6	8.8
PHYLUM ARTHROPODA						
CLASS INSECTA						
ORDER EPHEMEROPTERA						
FAMILY BAETIDAE						
BAETIS	57.5	134.1	191.6	127.7	67.3	4.6
ORDER TRICHOPTERA						
FAMILY HYDROPTILIDAE						
HYDROPTILA	.0	.0	19.2	6.4	11.1	.2
ORDER COLEOPTERA						
FAMILY DYTISCIDAE						
AGABUS	134.1	134.1	440.6	236.3	177.0	8.5
DESCNECTES	.0	19.2	.0	6.4	11.1	.2
ORDER DIPTERA						
FAMILY CERATOPOGONIDAE						
SUBFAMILY CERATOPOGONINAE	.0	19.2	19.2	12.8	11.1	.5
FAMILY CHIRONOMIDAE						
SUBFAMILY TANYPODINAE						
TRIBE MACROPELOPIINI	498.1	402.3	1034.5	645.0	340.7	23.3
SUBFAMILY ORTHOCLADIINAE						
TRIBES ORTHOCLADIINI AND METRIOCNEMIINI	268.2	95.8	134.1	166.0	90.5	6.0
SUBFAMILY CHIRONOMINAE						
TRIBE CHIRONOMINI	19.2	.0	.0	6.4	11.1	.2
FAMILY EMPIDIDAE	383.1	287.4	555.6	408.7	135.9	14.8
FAMILY SIMULIDAE						
SIMULIUM	421.5	728.0	574.7	574.7	153.3	20.8
FAMILY TABANIDAE						
TABANUS	.0	.0	19.2	6.4	11.1	.2
FAMILY TIPULIDAE						
TIPULA	19.2	.0	19.2	12.8	11.1	.5
TOTAL	2203.1	2452.1	3639.8	2765.0	767.8	100.0

DIVERSITY INDEX CALCULATIONS

SHANNON INDEX - 2.062
VARIANCE - .0002
MAXIMUM INDEX - 2.708
EVENNESS - .761
NO OF TAXA - 15

STATION NUMBER - YC-2 YELLOW CREEK
NUMBER OF REPLICATES - 3
SAMPLE DATE - 042881

TAXON	DENSITY(#/M2) REP 1	REP 2	REP 3	MEAN	S.D.	PERCENT RELATIVE ABUNDANCE
PHYLUM ANNELIDA						
CLASS OLIGOCHAETA						
ORDER HAPLOTAXIDA						
FAMILY TURIFICIDAE	785.4	1570.9	2069.0	1475.1	647.1	54.1
CLASS HIRUDINEA						
ORDER RHYNCHOBDELLIDA						
FAMILY GLOSSIPHONIIDAE						
HELOBDELLA STAGNALIS	229.9	862.1	.0	364.0	446.4	13.3
PHYLUM MOLLUSCA						
CLASS GASTROPODA						
ORDER BASSOMATOPHORA						
FAMILY LYMNAEIDAE						
LYMNAEA	57.5	.0	172.4	76.6	87.8	2.8
PHYLUM ARTHROPODA						
CLASS CRUSTACEA						
ORDER AMPHIPODA						
FAMILY TALITRIDAE						
HYALELLA AZTECA	325.7	364.0	613.0	434.2	156.0	15.9
CLASS INSECTA						
ORDER ODONATA						
FAMILY COENAGRIONIDAE						
AMPHIAGRION	38.3	.0	19.2	19.2	19.2	.7
ORDER COLEOPTERA						
FAMILY DRYOPIDAE						
HELICHUS	.0	19.2	.0	6.4	11.1	.2
FAMILY DYTISCIDAE						
AGABUS	.0	19.2	.0	6.4	11.1	.2
DERONECTES	76.6	.0	.0	25.5	44.2	.9
ORDER DIPTERA						
FAMILY CERATOPOGONIDAE						
SUBFAMILY CERATOPOGONINAE	19.2	95.8	.0	38.3	50.7	1.4
FAMILY CHIRONOMIDAE						
SUBFAMILY TANYPODINAE						
TRIBE MACROPELOPIINI	.0	19.2	38.3	19.2	19.2	.7
SUBFAMILY ORTHOCLADIINAE						
TRIBES ORTHOCLADIINI AND METRIOCNEMIINI	38.3	19.2	.0	19.2	19.2	.7
SUBFAMILY CHIRONOMINAE						
TRIBE CHIRONOMINI	.0	19.2	.0	6.4	11.1	.2
FAMILY SIMULIDAE						
SIMULIUM	57.5	325.7	306.5	229.9	149.6	8.4
FAMILY STRATIOMYIDAE						
EUPARYPHUS	.0	.0	19.2	6.4	11.1	.2
TOTAL	1628.4	3314.2	3237.5	2726.7	952.0	100.0

DIVERSITY INDEX CALCULATIONS

SHANNON INDEX - 1.468
VARIANCE - .0005
MAXIMUM INDEX - 2.639
EVENNESS - .556
NO OF TAXA - 14

STATION NUMBER - YC-3 YELLOW CREEK
NUMBER OF REPLICATES - 3
SAMPLE DATE - 042981

TAXON	DENSITY(#/M2) REP 1	REP 2	REP 3	MEAN	S.D.	PERCENT RELATIVE ABUNDANCE
PHYLUM ANNELIDA						
CLASS OLIGOCHAETA						
ORDER HAPLOTAXIDA						
FAMILY TUBIFICIDAE	38.3	38.3	38.3	38.3	.0	2.6
PHYLUM ARTHROPODA						
CLASS ARACHNIDA						
ORDER ACARINA	19.2	.0	.0	6.4	11.1	.5
CLASS INSECTA						
ORDER ODONATA						
FAMILY COENAGRIONIDAE						
AMPHIAGRION	.0	.0	19.2	6.4	11.1	.5
ORDER TRICHOPTERA						
FAMILY HYDROPSYCHIDAE						
HYDROPSYCHE	19.2	.0	.0	6.4	11.1	.5
ORDER DIPTERA						
FAMILY CERATOPOGONIDAE						
SUBFAMILY CERATOPOGONINAE	210.7	38.3	114.9	121.3	86.4	8.9
FAMILY CHIRONOMIDAE						
SUBFAMILY TANYPODINAE						
TRIBE PENTANEURINI	.0	.0	19.2	6.4	11.1	.5
TRIBE MACROPELOPIINI	.0	.0	19.2	6.4	11.1	.5
SUBFAMILY ORTHOCLADIINAE						
TRIBES ORTHOCLADIINI AND METRIOCNEMIINI	977.0	1034.5	1302.7	1104.7	173.8	81.2
SUBFAMILY CHIRONOMINAE						
TRIBE TANYTARSINI	.0	95.8	38.3	44.7	48.2	3.3
FAMILY EPHYDRIDAE	.0	19.2	.0	6.4	11.1	.5
FAMILY TABANIDAE						
CHRYSOPS	.0	.0	38.3	12.8	22.1	.9
TOTAL	1264.4	1226.1	1590.0	1360.2	200.0	100.0

DIVERSITY INDEX CALCULATIONS

SHANNON INDEX - .792
VARIANCE - .0012
MAXIMUM INDEX - 2.398
EVENNESS - .330
NO OF TAXA - 11

STATION NUMBER - WR-1 WHITE RIVER
NUMBER OF REPLICATES - 3
SAMPLE DATE - 042981

TAXON	DENSITY(#/M2) REP 1	REP 2	REP 3	MEAN	S.D.	PERCENT RELATIVE ABUNDANCE

PHYLUM NEMATODA	.0	19.2	.0	6.4	11.1	.3
PHYLUM ANNELIDA						
CLASS OLIGOCHAETA						
ORDER HAPLOTAXIDA						
FAMILY TUBIFICIDAE	440.6	134.1	2911.9	1162.2	1523.0	46.5
PHYLUM ARTHROPODA						
CLASS INSECTA						
ORDER EPHEMEROPTERA						
FAMILY BAETIDAE						
BAETIS	134.1	19.2	38.3	63.9	61.6	2.6
FAMILY HEPTAGENIIDAE						
HEPTAGENIA	.0	57.5	.0	19.2	33.2	.8
RHITHROGENA	.0	19.2	.0	6.4	11.1	.3
FAMILY EPHEMERELLIDAE						
EPHEMERELLA (EPHEMERELLA)	613.0	459.8	153.3	408.7	234.1	16.4
ORDER ODONATA						
FAMILY GOMPHIDAE						
OPHIOGOMPHUS	.0	19.2	.0	6.4	11.1	.3
ORDER PLECOPTERA						
FAMILY PERLODIDAE						
ISOPERLA	57.5	325.7	.0	127.7	173.8	5.1
ISOGENOIDES ELONGATUS	.0	19.2	.0	6.4	11.1	.3
ORDER TRICHOPTERA						
FAMILY HYDROPSYCHIDAE						
HYDROPSYCHE	172.4	.0	57.5	76.6	87.8	3.1
ORDER COLEOPTERA						
FAMILY ELMIDAE						
DUBIRAPHIA	.0	.0	19.2	6.4	11.1	.3
ORDER DIPTERA						
FAMILY CHIRONOMIDAE						
SUBFAMILY DIAMESINAE						
TRIBE PRODIAMESINI	325.7	.0	229.9	185.2	167.4	7.4
SUBFAMILY ORTHOCLADIINAE						
TRIBES ORTHOCLADIINI AND METRIOCNEMIINI	95.8	.0	19.2	38.3	50.7	1.5
SUBFAMILY CHIRONOMINAE						
TRIBE CHIRONOMINI	670.5	19.2	402.3	364.0	327.4	14.6
TRIBE TANYTARSINI	38.3	.0	19.2	19.2	19.2	.8
TOTAL	2547.9	1092.0	3850.6	2496.8	1380.0	100.0

DIVERSITY INDEX CALCULATIONS

SHANNON INDEX - 1.694
VARIANCE - .0005
MAXIMUM INDEX - 2.708
EVENNESS - .625
NO OF TAXA - 15

STATION NUMBER - WR-2 WHITE RIVER
NUMBER OF REPLICATES - 3
SAMPLE DATE - 042981

TAXON	DENSITY(#/M2) REP 1	REP 2	REP 3	MEAN	S.D.	PERCENT RELATIVE ABUNDANCE
PHYLUM ANNELIDA						

CLASS OLIGOCHAETA						
ORDER HAPLOTAXIDA						
FAMILY TUBIFICIDAE	1532.6	134.1	38.3	568.3	836.4	27.1
PHYLUM ARTHROPODA						
CLASS INSECTA						
ORDER EPHEMEROPTERA						
FAMILY BAETIDAE						
BAETIS	153.3	172.4	134.1	153.3	19.2	7.3
FAMILY HEPTAGENIIDAE						
RHITHROGENA	38.3	.0	.0	12.8	22.1	.6
FAMILY EPHEMERELLIDAE						
EPHEMERELLA (EPHEMERELLA)	325.7	421.5	555.6	434.2	115.5	20.7
ORDER PLECOPTERA						
FAMILY PERLODIDAE						
ISOPERLA	153.3	57.5	38.3	83.0	61.6	4.0
ORDER TRICHOPTERA						
FAMILY HYDROPSYCHIDAE						
CHEUMATOPSYCHE	.0	.0	19.2	6.4	11.1	.3
HYDROPSYCHE	134.1	842.9	1034.5	670.5	474.3	31.9
ORDER LEPIDOPTERA						
FAMILY PYRALIDAE						
PARAPYRACTIS	.0	.0	38.3	12.8	22.1	.6
ORDER DIPTERA						
FAMILY CERATOPOGONIDAE						
SUBFAMILY CERATOPOGONINAE	19.2	.0	.0	6.4	11.1	.3
FAMILY CHIRONOMIDAE						
SUBFAMILY DIAMESINAE						
TRIBE PRODIAMESINI	19.2	.0	19.2	12.8	11.1	.6
SUBFAMILY ORTHOCLADIINAE						
TRIBE CORYNONEURINI	.0	19.2	.0	6.4	11.1	.3
TRIBES ORTHOCLADIINI AND METRIOCNEMIINI	19.2	.0	76.6	31.9	39.9	1.5
SUBFAMILY CHIRONOMINAE						
TRIBE CHIRONOMINI	38.3	19.2	38.3	31.9	11.1	1.5
FAMILY SIMULIDAE	.0	19.2	.0	6.4	11.1	.3
FAMILY TIPULIDAE						
HEXATOMA	.0	19.2	172.4	63.9	94.5	3.0
TOTAL	2433.0	1705.0	2164.8	2100.9	368.2	100.0

DIVERSITY INDEX CALCULATIONS

SHANNON INDEX - 1.760
VARIANCE - .0005
MAXIMUM INDEX - 2.708
EVENNESS - .650
NO OF TAXA - 15

BENTHOS (MACROINVERTEBRATES) DENSITY AND DIVERSITY CALCULATIONS

RIO BLANCO OIL SHALE COMPANY
TRACT C-A
072081

STATION NUMBER - CG-1 CORRAL GULCH
NUMBER OF REPLICATES - 3
SAMPLE DATE - 072081

TAXON	DENSITY(#/M2) REP 1	REP 2	REP 3	MEAN	S.D.	PERCENT RELATIVE ABUNDANCE
PHYLUM ARTHROPODA						
CLASS INSECTA						
ORDER EPHEMEROPTERA						
FAMILY BAETIDAE						
BAETIS	57.5	.0	.0	19.2	33.2	50.0
ORDER DIPTERA						
FAMILY CHIRONOMIDAE						
SUBFAMILY ORTHOCLADIINAE						
TRIBES ORTHOCLADIINI AND METRIOCNEMIINI	19.2	.0	.0	6.4	11.1	16.7
SUBFAMILY CHIRONOMINAE						
TRIBE CHIRONOMINI	19.2	.0	.0	6.4	11.1	16.7
FAMILY STRATIOMYIDAE						
STRATIOMYS	19.2	.0	.0	6.4	11.1	16.7
TOTAL	114.9	.0	.0	38.3	66.4	100.0

DIVERSITY INDEX CALCULATIONS

SHANNON INDEX - 1.242
VARIANCE - .0079
MAXIMUM INDEX - 1.386
EVENNESS - .896
NO OF TAXA - 4

STATION NUMBER - YC-1 YELLOW CREEK
NUMBER OF REPLICATES - 3
SAMPLE DATE - 072081

TAXON	DENSITY(#/M2) REP 1	REP 2	REP 3	MEAN	S.D.	PERCENT RELATIVE ABUNDANCE
PHYLUM ARTHROPODA						
CLASS INSECTA						
ORDER EPHEMEROPTERA						
FAMILY BAETIDAE						
CALLIBAETIS	19.2	19.2	.0	12.8	11.1	40.0
ORDER COLEOPTERA						
FAMILY HALIPLIDAE						

HALIPLUS	.0	19.2	.0	6.4	11.1	20.0
ORDER DIPTERA						
FAMILY CHIRONOMIDAE						
SUBFAMILY ORTHOCLADIINAE						
TRIBES ORTHOCLADIINI AND METRIOCNEMIINI	.0	.0	19.2	6.4	11.1	20.0
FAMILY SIMULIDAE						
SIMULIUM	.0	19.2	.0	6.4	11.1	20.0
TOTAL	19.2	57.5	19.2	31.9	22.1	100.0

DIVERSITY INDEX CALCULATIONS

SHANNON INDEX - 1.332
VARIANCE - .0036
MAXIMUM INDEX - 1.386
EVENNESS - .961
NO OF TAXA - 4

STATION NUMBER - YC-2 YELLOW CREEK
NUMBER OF REPLICATES - 3
SAMPLE DATE - 072081

TAXON	DENSITY(#/M2) REP 1	REP 2	REP 3	MEAN	S.D.	PERCENT RELATIVE ABUNDANCE
PHYLUM ANNELIDA						
CLASS OLIGOCHAETA						
ORDER HAPLOTAXIDA						
FAMILY TUBIFICIDAE	478.9	325.7	287.4	364.0	101.4	7.2
CLASS HIRUDINEA						
ORDER RHYNCHOBDELLIDA						
FAMILY GLOSSIPHONIIDAE						
HELOBDELLA STAGNALIS	153.3	76.6	134.1	121.3	39.9	2.4
PHYLUM MOLLUSCA						
CLASS GASTROPODA						
ORDER BASSOMATOPHORA						
FAMILY LYMNAEIDAE						
LYMNAEA	402.3	19.2	210.7	210.7	191.6	4.1
PHYLUM ARTHROPODA						
CLASS CRUSTACEA						
ORDER AMPHIPODA						
FAMILY TALITRIDAE						
HYALELLA AZTECA	4214.6	1264.4	6341.0	3940.0	2549.4	77.4
CLASS INSECTA						
ORDER EPHEMEROPTERA						
FAMILY BAETIDAE						
CALLIBAETIS	325.7	38.3	344.8	236.3	171.7	4.6
FAMILY CAENIDAE						
CAENIS	19.2	.0	.0	6.4	11.1	.1
ORDER ODONATA						
FAMILY COENAGRIONIDAE						
AMPHIAGRION	76.6	38.3	76.6	63.9	22.1	1.2
ORDER COLEOPTERA						
FAMILY HYDROPHILIDAE						
TROPISTERNUS	.0	57.5	.0	19.2	33.2	.4
FAMILY DYTISCIDAE						

TAXON	REP 1	REP 2	REP 3	MEAN	S.D.	PERCENT RELATIVE ABUNDANCE
DERONECTES	19.2	19.2	.0	12.8	11.1	.3
ORDER DIPTERA						
FAMILY CERATOPOGONIDAE						
SUBFAMILY CERATOPOGONINAE	19.2	.0	.0	6.4	11.1	.1
FAMILY CHIRONOMIDAE						
SUBFAMILY ORTHOCLADIINAE						
TRIBES ORTHOCLADIINI AND METRIOCNEMIINI	76.6	38.3	38.3	51.1	22.1	1.0
SUBFAMILY CHIRONOMINAE						
TRIBE TANYTARSINI	114.9	19.2	19.2	51.1	55.3	1.0
FAMILY TABANIDAE						
CHRYSOPS	.0	19.2	.0	6.4	11.1	.1
TOTAL	5900.4	1915.7	7452.1	5089.4	2855.9	100.0

DIVERSITY INDEX CALCULATIONS

SHANNON INDEX - .959
VARIANCE - .0004
MAXIMUM INDEX - 2.565
EVENNESS - .374
NO OF TAXA - 13

STATION NUMBER - YC-3 YELLOW CREEK
NUMBER OF REPLICATES - 3
SAMPLE DATE - 072081

TAXON	DENSITY(#/M2) REP 1	REP 2	REP 3	MEAN	S.D.	PERCENT RELATIVE ABUNDANCE
PHYLUM ANNELIDA						
CLASS OLIGOCHAETA						
ORDER HAPLOTAXIDA						
FAMILY TUBIFICIDAE	364.6	1187.7	76.6	542.8	576.7	23.1
CLASS HIRUDINEA						
ORDER RHYNCHOBDELLIDA						
FAMILY GLOSSIPHONIIDAE						
HELOBDELLA STAGNALIS	.0	.0	76.6	25.5	44.2	1.1
PHYLUM ARTHROPODA						
CLASS CRUSTACEA						
ORDER AMPHIPODA						
FAMILY TALITRIDAE						
HYALELLA AZTECA	.0	.0	38.3	12.8	22.1	.5
CLASS ARACHNIDA						
ORDER ACARINA	19.2	.0	.0	6.4	11.1	.3
CLASS INSECTA						
ORDER EPHEMEROPTERA						
FAMILY BAETIDAE						
CALLIBAETIS	95.8	.0	38.3	44.7	48.2	1.9
ORDER ODONATA						
FAMILY COENAGRIONIDAE						
AMPHIAGRION	.0	.0	19.2	6.4	11.1	.3
ORDER TRICHOPTERA						
FAMILY HYDROPSYCHIDAE						
HYDROPSYCHE	19.2	.0	.0	6.4	11.1	.3
ORDER COLEOPTERA						
FAMILY DYTISCIDAE						

DERONECTES	.0	.0	38.3	12.8	22.1	.5
ORDER DIPTERA						
FAMILY CHIRONOMIDAE						
SUBFAMILY TANYPODINAE						
TRIBE MACROPLEOPIINI	.0	.0	38.3	12.8	22.1	.5
SUBFAMILY ORTHOCLADIINAE						
TRIBES ORTHOCLADIINI AND METRIOCNEMIINI	38.3	.0	.0	12.8	22.1	.5
FAMILY SIMULIDAE						
SIMULIUM	3371.6	114.9	1494.3	1660.3	1634.7	70.7
FAMILY TABANIDAE						
TABANUS	19.2	.0	.0	6.4	11.1	.3
TOTAL	3927.2	1302.7	1819.9	2349.9	1390.2	100.0

DIVERSITY INDEX CALCULATIONS

SHANNON INDEX - .886
VARIANCE - .0005
MAXIMUM INDEX - 2.485
EVENNESS - .357
NO OF TAXA - 12

STATION NUMBER - WR-1 WHITE RIVER
NUMBER OF REPLICATES - 3
SAMPLE DATE - 072081

TAXON	DENSITY(#/M2) REP 1	REP 2	REP 3	MEAN	S.D.	PERCENT RELATIVE ABUNDANCE
PHYLUM ANNELIDA						
CLASS OLIGOCHAETA						
ORDER HAPLOTAXIDA						
FAMILY TUBIFICIDAE	.0	38.3	76.6	38.3	38.3	.7
PHYLUM ARTHROPODA						
CLASS INSECTA						
ORDER EPHEMEROPTERA						
FAMILY BAETIDAE						
BAETIS	134.1	95.8	38.3	89.4	48.2	1.7
CALLIBAETIS	.0	19.2	.0	6.4	11.1	.1
FAMILY EPHEMERELLIDAE						
EPHEMERELLA (SERRATELLA)	19.2	19.2	38.3	25.5	11.1	.5
FAMILY LEPTOPHLEBIIDAE						
CHOROTERPES (CHOROTERPES)	19.2	210.7	.0	76.6	116.5	1.4
TRAVERELLA	76.6	38.3	.0	38.3	38.3	.7
FAMILY TRICORYTHIDAE						
TRICORYTHODES	5766.3	5440.6	2739.5	4648.8	1661.5	87.1
ORDER ODONATA						
FAMILY GOMPHIDAE						
OCTOGOMPHUS	.0	19.2	.0	6.4	11.1	.1
ORDER TRICHOPTERA						
FAMILY BRACHYCENTRIDAE						
BRACHYCENTRUS	19.2	.0	.0	6.4	11.1	.1
FAMILY HYDROPSYCHIDAE						
CHEUMATOPSYCHE	19.2	.0	.0	6.4	11.1	.1
HYDROPSYCHE	134.1	95.8	.0	76.6	69.1	1.4
FAMILY HYDROPTILIDAE						

HYDROPTILA	19.2	19.2	.0	12.8	11.1	.2
ORDER LEPIDOPTERA						
FAMILY PYRALIDAE						
PARARGYRACTIS	19.2	.0	.0	6.4	11.1	.1
ORDER DIPTERA						
FAMILY CHIRONOMIDAE						
SUBFAMILY ORTHOCLADIINAE						
TRIBES ORTHOCLADIINI AND METRIOCNEMIINI	76.6	19.2	19.2	38.3	33.2	.7
SUBFAMILY CHIRONOMINAE						
TRIBE CHIRONOMINI	306.5	249.0	229.9	261.8	39.9	4.9
TOTAL	6609.2	6264.4	3141.8	5338.4	1910.2	100.0

DIVERSITY INDEX CALCULATIONS

SHANNON INDEX - .645
VARIANCE - .0003
MAXIMUM INDEX - 2.708
EVENNESS - .238
NO OF TAXA - 15

STATION NUMBER - WR-2 WHITE RIVER
NUMBER OF REPLICATES - 3
SAMPLE DATE - 072081

TAXON	DENSITY(#/M2) REP 1	REP 2	REP 3	MEAN	S.D.	PERCENT RELATIVE ABUNDANCE
PHYLUM NEMATODA	19.2	.0	.0	6.4	11.1	.2
PHYLUM ANNELIDA						
CLASS OLIGOCHAETA						
ORDER HAPLOTAXIDA						
FAMILY TUBIFICIDAE	.0	.0	38.3	12.8	22.1	.3
PHYLUM ARTHROPODA						
CLASS INSECTA						
ORDER EPHEMEROPTERA						
FAMILY BAETIDAE						
BAETIS	76.6	76.6	172.4	108.6	55.3	2.7
FAMILY HEPTAGENIIDAE						
HEPTAGENIA	95.8	38.3	57.5	63.9	29.3	1.6
PHITHROGENA	153.3	76.6	95.8	108.6	39.9	2.7
FAMILY EPHEMERELLIDAE						
EPHEMERELLA (SERRATELLA)	57.5	38.3	57.5	51.1	11.1	1.3
FAMILY LEPTOPHLEBIIDAE						
CHOROTERPES (CHOROTERPES)	191.6	210.7	172.4	191.6	19.2	4.8
TRAVERELLA	57.5	306.5	19.2	127.7	156.0	3.2
FAMILY TRICORYTHIDAE						
TRICORYTHODES	2682.0	2145.6	2528.7	2452.1	276.3	61.1
ORDER PLECOPTERA						
FAMILY PERLODIDAE						
ISOGENOIDES ELONGATUS	.0	19.2	.0	6.4	11.1	.2
ORDER TRICHOPTERA						
FAMILY BRACHYCENTRIDAE						
BRACHYCENTRUS	.0	38.3	.0	12.8	22.1	.3
FAMILY HYDROPSYCHIDAE						
CHEUMATOPSYCHE	.0	38.3	76.6	38.3	38.3	1.0

HYDROPSYCHE	76.6	344.8	459.8	293.7	196.6	7.3
ORDER LEPIDOPTERA						
FAMILY PYRALIDAE						
PARARGYRACTIS	19.2	.0	57.5	25.5	29.2	.6
ORDER DIPTERA						
FAMILY CHIRONOMIDAE						
SUBFAMILY DIAMESINAE						
TRIBE DIAMESINI	19.2	.0	.0	6.4	11.1	.2
SUBFAMILY ORTHOCLADIINAE						
TRIBES ORTHOCLADIINI AND METRIOCNEMIINI	306.5	114.9	766.3	395.9	334.7	9.9
SUBFAMILY CHIRONOMINAE						
TRIBE CHIRONOMINI	19.2	19.2	95.8	44.7	44.2	1.1
FAMILY SIMULIDAE						
SIMULIUM	19.2	.0	153.3	57.5	83.5	1.4
FAMILY TIPULIDAE						
HEXATOMA	.0	.0	19.2	6.4	11.1	.2
TOTAL	3793.1	3467.4	4770.1	4010.2	677.9	100.0

DIVERSITY INDEX CALCULATIONS

SHANNON INDEX - 1.558
VARIANCE - .0005
MAXIMUM INDEX - 2.944
EVENNESS - .529
NO OF TAXA - 19

BENTHOS (MACROINVERTEBRATES) DENSITY AND DIVERSITY CALCULATIONS

RIO BLANCO OIL SHALE COMPANY
TRACT C-A
100981

STATION NUMBER - CG-1 CORRAL GULCH
NUMBER OF REPLICATES - 3
SAMPLE DATE - 100981

TAXON	DENSITY(#/M2) REP 1	REP 2	REP 3	MEAN	S.D.	PERCENT RELATIVE ABUNDANCE
PHYLUM ANNELIDA						
CLASS OLIGOCHAETA						
ORDER HAPLOTAXIDA						
FAMILY HAPLOTAXIDAE						
HAPLOTAXIS GORDIOIDES	.0	.0	19.2	6.4	11.1	2.6
FAMILY NAIDIDAE	.0	.0	76.6	25.5	44.2	10.3
CLASS HIRUDINEA						
ORDER RHYNCHOBDELLIDA						
FAMILY GLOSSIPHONIIDAE						
HELOBDELLA STAGNALIS	.0	76.6	.0	25.5	44.2	10.3
PHYLUM ARTHROPODA						
CLASS CRUSTACEA						
ORDER AMPHIPODA						
FAMILY TALITRIDAE						
HYALELLA AZTECA	57.5	344.8	76.6	159.6	160.7	64.1
CLASS INSECTA						
ORDER EPHEMEROPTERA						
FAMILY EPHEMERELLIDAE						
EPHEMERELLA (SERRATELLA)	.0	.0	19.2	6.4	11.1	2.6
ORDER DIPTERA						
FAMILY CHIRONOMIDAE						
SUBFAMILY DIAMESINAE						
TRIBE DIAMESINI	.0	.0	19.2	6.4	11.1	2.6
SUBFAMILY ORTHOCLADIINAE						
TRIBES ORTHOCLADIINI AND METRIOCNEMIINI	38.3	.0	.0	12.8	22.1	5.1
FAMILY MUSCIDAE	.0	.0	19.2	6.4	11.1	2.6
TOTAL	95.8	421.5	229.9	249.0	163.7	100.0

DIVERSITY INDEX CALCULATIONS

SHANNON INDEX - 1.260
VARIANCE - .0155
MAXIMUM INDEX - 2.079
EVENNESS - .606
NO OF TAXA - 8

STATION NUMBER - YC-1 YELLOW CREEK
NUMBER OF REPLICATES - 3
SAMPLE DATE - 100981

TAXON	DENSITY(#/M2) REP 1	REP 2	REP 3	MEAN	S.D.	PERCENT RELATIVE ABUNDANCE
PHYLUM ANNELIDA						
CLASS OLIGOCHAETA						
ORDER HAPLOTAXIDA						
FAMILY TUBIFICIDAE	76.6	114.9	229.9	140.5	79.8	2.4
PHYLUM ARTHROPODA						
CLASS CRUSTACEA						
ORDER AMPHIPODA						
FAMILY TALITRIDAE						
HYALELLA AZTECA	.0	19.2	19.2	12.8	11.1	.2
CLASS INSECTA						
ORDER EPHEMEROPTERA						
FAMILY BAETIDAE						
CALLIBAETIS	459.8	191.6	134.1	261.8	173.8	4.5
ORDER ODONATA						
FAMILY COENAGRIONIDAE						
AMPHIAGRION	38.3	.0	.0	12.8	22.1	.2
ENALLAGMA	19.2	19.2	.0	12.8	11.1	.2
ORDER TRICHOPTERA						
FAMILY HYDROPSYCHIDAE						
HYDROPSYCHE	.0	.0	19.2	6.4	11.1	.1
FAMILY HYDROPTILIDAE						
HYDROPTILA	.0	57.5	.0	19.2	33.2	.3
ORDER LEPIDOPTERA						
FAMILY PYRALIDAE						
PARARGYRACTIS	19.2	.0	.0	6.4	11.1	.1
ORDER DIPTERA						
FAMILY CERATOPOGONIDAE						
SUBFAMILY CERATOPOGONINAE	.0	.0	19.2	6.4	11.1	.1
FAMILY CHIRONOMIDAE						
SUBFAMILY TANYPODINAE						
TRIBE MACROPELOPIINI	134.1	191.6	19.2	114.9	87.8	2.0
SUBFAMILY ORTHOCLADIINAE						
TRIBE CORYNONEURINI	19.2	57.5	57.5	44.7	22.1	.8
TRIBES ORTHOCLADIINI AND METRIOCNEMIINI	191.6	325.7	306.5	274.6	72.5	4.7
SUBFAMILY CHIRONOMINAE						
TRIBE CHIRONOMINI	19.2	38.3	57.5	38.3	19.2	.7
TRIBE TANYTARSINI	172.4	210.7	172.4	185.2	22.1	3.2
FAMILY SIMULIDAE						
SIMULIUM	957.9	3333.3	9636.0	4642.4	4484.7	80.0
FAMILY MUSCIDAE	38.3	.0	19.2	19.2	19.2	.3
FAMILY TAPANIDAE						
TABANUS	.0	19.2	.0	6.4	11.1	.1
TOTAL	2145.6	4578.5	10689.7	5804.6	4402.0	100.0

DIVERSITY INDEX CALCULATIONS

SHANNON INDEX - .919
VARIANCE - .0004
MAXIMUM INDEX - 2.833
EVENNESS - .324
NO OF TAXA - 17

STATION NUMBER - YC-2 YELLOW CREEK
NUMBER OF REPLICATES - 3
SAMPLE DATE - 100981

TAXON	DENSITY(#/M2) REP 1	REP 2	REP 3	MEAN	S.D.	PERCENT RELATIVE ABUNDANCE
PHYLUM ANNELIDA						
CLASS OLIGOCHAETA						
ORDER HAPLOTAXIDA						
FAMILY TUBIFICIDAE	76.6	2605.4	440.6	1040.9	1367.1	8.6
CLASS HIRUDINEA						
ORDER RHYNCHOBDELLIDA						
FAMILY GLOSSIPHONIIDAE						
HELOBDELLA STAGNALIS	268.2	1111.1	364.0	581.1	461.5	4.8
PHYLUM MOLLUSCA						
CLASS GASTROPODA						
ORDER BASSOMATOPHORA						
FAMILY LYMNAEIDAE						
LYMNAEA	76.6	1264.4	249.0	530.0	641.8	4.4
PHYLUM ARTHROPODA						
CLASS CRUSTACEA						
ORDER AMPHIPODA						
FAMILY TALITRIDAE						
HYALELLA AZTECA	3639.8	7931.0	12739.5	8103.4	4552.3	66.6
ORDER OSTRACODA						
SUBORDER PODOCOPA	.0	.0	19.2	6.4	11.1	.1
CLASS INSECTA						
ORDER EPHEMEROPTERA						
FAMILY BAETIDAE						
CALLIBAETIS	76.6	191.6	95.8	121.3	61.6	1.0
ORDER ODONATA						
FAMILY COENAGRIONIDAE						
AMPHIAGRION	.0	57.5	19.2	25.5	29.3	.2
ARGIA	19.2	.0	.0	6.4	11.1	.1
ENALLAGMA	38.3	19.2	.0	19.2	19.2	.2
ORDER TRICHOPTERA						
FAMILY LIMNEPHILIDAE						
LIMNEPHILUS	.0	19.2	.0	6.4	11.1	.1
ORDER COLEOPTERA						
FAMILY DRYOPIDAE						
HELICHUS	19.2	.0	76.6	31.9	39.9	.3
FAMILY DYTISCIDAE						
OERONECTES	38.3	114.9	76.6	76.6	38.3	.6
ORDER DIPTERA						
FAMILY CHIRONOMIDAE						
SUBFAMILY ORTHOCLADIINAE						
TRIBE CORYNONEURINI	.0	19.2	.0	6.4	11.1	.1
TRIBES ORTHOCLADIINI AND METRIOCNEMIINI	134.1	.0	249.0	127.7	124.6	1.0
SUBFAMILY CHIRONOMINAE						
TRIBE CHIRONOMINI	19.2	19.2	57.5	31.9	22.1	.3
TRIBE TANYTARSINI	38.3	881.2	172.4	364.0	452.9	3.0
FAMILY SIMULIDAE						
SIMULIUM	114.9	1206.9	1896.6	1072.8	898.3	8.8
FAMILY TABANIDAE						
TABANUS	19.2	.0	19.2	12.8	11.1	.1
TOTAL	4578.5	15440.6	16475.1	12164.8	6590.2	100.0

DIVERSITY INDEX CALCULATIONS

SHANNON INDEX - 1.285
VARIANCE - .0002
MAXIMUM INDEX - 2.890
EVENNESS - .445
NO OF TAXA - 18

STATION NUMBER - YC-3 YELLOW CREEK
NUMBER OF REPLICATES - 3
SAMPLE DATE - 100981

TAXON	DENSITY(#/M2) REP 1	REP 2	REP 3	MEAN	S.D.	PERCENT RELATIVE ABUNDANCE
PHYLUM ANNELIDA						
CLASS OLIGOCHAETA						
ORDER HAPLOTAXIDA						
FAMILY TUBIFICIDAE	766.3	1149.4	785.4	900.4	215.9	61.8
PHYLUM ARTHROPODA						
CLASS INSECTA						
ORDER EPHEMEROPTERA						
FAMILY BAETIDAE						
CALLIBAETIS	38.3	76.6	38.3	51.1	22.1	3.5
FAMILY TRICORYTHIDAE						
TRICORYTHODES	.0	.0	38.3	12.8	22.1	.9
ORDER ODONATA						
FAMILY COENAGRIONIDAE						
AMPHIAGRION	134.1	19.2	38.3	63.9	61.6	4.4
ARGIA	134.1	153.3	172.4	153.3	19.2	10.5
ENALLAGMA	172.4	57.5	19.2	83.0	79.8	5.7
ORDER HEMIPTERA						
FAMILY CORIXIDAE						
SIGARA	.0	19.2	19.2	12.8	11.1	.9
ORDER COLEOPTERA						
FAMILY DYTISCIDAE						
DERONECTES	38.3	.0	.0	12.8	22.1	.9
ORDER DIPTERA						
FAMILY CERATOPOGONIDAE						
SUBFAMILY CERATOPOGONINAE	.0	38.3	.0	12.8	22.1	.9
FAMILY CHIRONOMIDAE						
SUBFAMILY ORTHOCLADIINAE						
TRIBES ORTHOCLADIINI AND METRIOCNEMIINI	19.2	134.1	76.6	76.6	57.5	5.3
SUBFAMILY CHIRONOMINAE						
TRIBE CHIRONOMINI	19.2	19.2	.0	12.8	11.1	.9
TRIBE TANYTARSINI	.0	57.5	.0	19.2	33.2	1.3
FAMILY SIMULIDAE						
SIMULIUM	19.2	38.3	38.3	31.9	11.1	2.2
FAMILY TABANIDAE						
TABANUS	38.3	.0	.0	12.8	22.1	.9
TOTAL	1379.3	1762.5	1226.1	1455.9	276.2	100.0

DIVERSITY INDEX CALCULATIONS

SHANNON INDEX - 1.457

VARIANCE - .0013
MAXIMUM INDEX - 2.639
EVENNESS - .567
NO OF TAXA - 14

STATION NUMBER - WR-1 WHITE RIVER
NUMBER OF REPLICATES - 3
SAMPLE DATE - 100981

TAXON	DENSITY(#/M2) REP 1	REP 2	REP 3	MEAN	S.D.	PERCENT RELATIVE ABUNDANCE
PHYLUM ANNELIDA						
CLASS OLIGOCHAETA						
ORDER HAPLOTAXIDA						
FAMILY TUBIFICIDAE	383.1	325.7	325.7	344.8	33.2	13.5
PHYLUM ARTHROPODA						
CLASS INSECTA						
ORDER EPHEMEROPTERA						
FAMILY BAETIDAE						
BAETIS	210.7	153.3	172.4	178.8	29.3	7.0
FAMILY HEPTAGENIIDAE						
RHITHROGENA	19.2	.0	38.3	19.2	19.2	.8
FAMILY TRICORYTHIDAE						
TRICORYTHODES	95.8	95.8	57.5	83.0	22.1	3.3
ORDER ODONATA						
FAMILY GOMPHIDAE						
OPHIOGOMPHUS	19.2	.0	.0	6.4	11.1	.3
ORDER PLECOPTERA						
FAMILY PERLODIDAE						
ISOGENOIDES ELONGATUS	19.2	.0	.0	6.4	11.1	.3
ORDER TRICHOPTERA						
FAMILY BRACHYCENTRIDAE						
BRACHYCENTRUS	95.8	.0	.0	31.9	55.3	1.3
FAMILY HYDROPSYCHIDAE						
CHEUMATOPSYCHE	153.3	.0	19.2	57.5	83.5	2.3
HYDROPSYCHE	1417.6	38.3	114.9	523.6	775.2	20.5
ORDER LEPIDOPTERA						
FAMILY PYRALIDAE						
PARARGYRACTIS	38.3	.0	19.2	19.2	19.2	.8
ORDER COLEOPTERA						
FAMILY ELMIDAE						
HEXACYLLOEPUS FERRUGINEUS	114.9	38.3	38.3	63.9	44.2	2.5
ORDER DIPTERA						
FAMILY CHIRONOMIDAE						
SUBFAMILY TANYPODINAE						
TRIBE PENTANEURINI	19.2	.0	.0	6.4	11.1	.3
TRIBE MACROPELOPIINI	249.0	.0	38.3	95.8	134.1	3.8
SUBFAMILY ORTHOCLADIINAE						
TRIBES ORTHOCLADIINI AND METRIOCNEMIINI	57.5	.0	.0	19.2	33.2	.8
SUBFAMILY CHIRONOMINAE						
TRIBE CHIRONOMINI	1264.4	766.3	1111.1	1047.3	255.1	41.0
TRIBE TANYTARSINI	19.2	.0	.0	6.4	11.1	.3
FAMILY SIMULIDAE						
SIMULIUM	19.2	.0	.0	6.4	11.1	.3
FAMILY TIPULIDAE						
HEXATOMA	114.9	.0	.0	38.3	66.4	1.5

TOTAL	4310.3	1417.6	1934.9	2554.3	1542.6	100.0

DIVERSITY INDEX CALCULATIONS

SHANNON INDEX - 1.862
VARIANCE - .0005
MAXIMUM INDEX - 2.890
EVENNESS - .644
NO OF TAXA - 18

STATION NUMBER - WR-2 WHITE RIVER
NUMBER OF REPLICATES - 3
SAMPLE DATE - 100981

TAXON	DENSITY(#/M2) REP 1	REP 2	REP 3	MEAN	S.D.	PERCENT RELATIVE ABUNDANCE
PHYLUM ANNELIDA						
CLASS OLIGOCHAETA						
ORDER HAPLOTAXIDA						
FAMILY TUBIFICIDAE	76.6	38.3	191.6	102.2	79.8	3.7
PHYLUM ARTHROPODA						
CLASS INSECTA						
ORDER EPHEMEROPTERA						
FAMILY BAETIDAE						
BAETIS	191.6	172.4	383.1	249.0	116.5	9.1
FAMILY HEPTAGENIIDAE						
HEPTAGENIA	19.2	.0	19.2	12.8	11.1	.5
RHITHROGENA	57.5	.0	229.9	95.8	119.6	3.5
FAMILY EPHEMERELLIDAE						
EPHEMERELLA (SERRATELLA)	57.5	.0	249.0	102.2	130.4	3.7
FAMILY LEPTOPHLEBIIDAE						
TRAVERELLA	.0	.0	19.2	6.4	11.1	.2
FAMILY TRICORYTHIDAE						
TRICORYTHODES	95.8	38.3	325.7	153.3	152.1	5.6
ORDER ODONATA						
FAMILY COENAGRIONIDAE						
ARGIA	.0	.0	19.2	6.4	11.1	.2
ORDER PLECOPTERA						
FAMILY PERLIDAE						
CLAASSENIA SABULOSA	.0	.0	19.2	6.4	11.1	.2
FAMILY PERLODIDAE						
ISOPERLA	.0	38.3	153.3	63.9	79.8	2.3
ISOGENOIDES ELONGATUS	19.2	.0	19.2	12.8	11.1	.5
ORDER TRICHOPTERA						
FAMILY BRACHYCENTRIDAE						
BRACHYCENTRUS	38.3	19.2	153.3	70.2	72.5	2.6
FAMILY HYDROPSYCHIDAE						
CHEUMATOPSYCHE	364.0	249.0	287.4	300.1	58.5	11.6
HYDROPSYCHE	1072.8	957.9	1724.1	1251.6	413.2	48.7
ORDER LEPIDOPTERA						
FAMILY PYRALIDAE						
PARAPYRACTIS	114.9	38.3	153.3	102.2	58.8	3.7
ORDER COLEOPTERA						
FAMILY ELMIDAE						
HEXACYLLOEPUS FERRUGINEUS	.0	57.5	76.6	44.7	39.9	1.6

OPTIOSERVUS	.0	[illegible]	.0	[illegible]	[illegible]	
ZAITZEVIA PARVULA	19.2	.0	.0	6.4	11.1	.7
ORDER DIPTERA						
FAMILY CHIRONOMIDAE						
SUBFAMILY TANYPODINAE						
TRIBE MACROPLEOPIINI	.0	.0	38.3	12.8	22.1	.5
SUBFAMILY CHIRONOMINAE						
TRIBE CHIRONOMINI	76.6	19.2	134.1	76.6	57.5	2.8
FAMILY SIMULIDAE						
SIMULIUM	.0	.0	57.5	19.2	33.2	.7
FAMILY TIPULIDAE						
HEXATOMA	57.5	19.2	38.3	38.3	19.2	1.4
TOTAL	2260.5	1666.7	4291.2	2739.5	1376.2	100.0

DIVERSITY INDEX CALCULATIONS

SHANNON INDEX - 2.054
VARIANCE - .0006
MAXIMUM INDEX - 3.091
EVENNESS - .664
NO OF TAXA - 22

APPENDIX 4-2.10

Statistical Analysis of the 1979-1981 RBOSC Benthic Macroinvertebrate Densities

RIO BLANCO OIL SHALE COMPANY
AQUATIC ECOLOGY MONITORING PROGRAM

THREE-WAY MIXED MODEL ANALYSIS OF VARIANCE
COMPARING MACROINVERTEBRATE DENSITY ESTIMATES

GENERAL LINEAR MODELS PROCEDURE

CLASS LEVEL INFORMATION

CLASS	LEVELS	VALUES
YEAR	3	1979 1980 1981
SEASON	3	FALL SPRING SUMMER
STATION	6	CORRAL GULCH - 1 WHITE RIVER - 1 WHITE RIVER - 2 YELLOW CREEK - 1 YELLOW CREEK - 2 YELLOW CREEK - 3

NUMBER OF OBSERVATIONS IN DATA SET = 1204

RIO BLANCO OIL SHALE COMPANY
AQUATIC ECOLOGY MONITORING PROGRAM

THREE-WAY MIXED MODEL ANALYSIS OF VARIANCE
COMPARING MACROINVERTEBRATE DENSITY ESTIMATES

GENERAL LINEAR MODELS PROCEDURE

DEPENDENT VARIABLE: DENSITY

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE
MODEL	41	36951925.74014622	901266.48146698
ERROR	1162	502810695.26823240	432711.44171104
CORRECTED TOTAL	1203	539762621.00837860	

MODEL F =	2.08	PR > F = 0.0001

R-SQUARE	C.V.	STD DEV	DENSITY MEAN
0.068460	330.4309	657.80805841	199.07580288

SOURCE	DF	TYPE I SS	F VALUE	PR > F
YEAR	2	268453.54793666	0.31	0.7334
SEASON	2	6502409.64454101	7.51	0.0006
STATION	5	14838874.42058195	6.86	0.0001
YEAR*SEASON	4	1199578.94554797	0.69	0.5968
YEAR*STATION	6	2047510.28589660	0.79	0.5788
SEASON*STATION	10	8541159.87124301	1.97	0.0328
YEAR*SEASON*STATION	12	3553939.02439898	0.68	0.7678

RIO BLANCO OIL SHALE COMPANY
AQUATIC ECOLOGY MONITORING PROGRAM

TWO-WAY MODEL I ANALYSIS OF VARIANCE
COMPARING MACROINVERTEBRATE DENSITY ESTIMATES - 1981

GENERAL LINEAR MODELS PROCEDURE

CLASS LEVEL INFORMATION

CLASS	LEVELS	VALUES
STATION	6	CORRAL GULCH - 1 WHITE RIVER - 1 WHITE RIVER - 2 YELLOW CREEK - 1 YELLOW CREEK - 2 YELLOW CREEK - 3
SEASON	3	FALL SPRING SUMMER

NUMBER OF OBSERVATIONS IN DATA SET = 244

RIO BLANCO OIL SHALE COMPANY
AQUATIC ECOLOGY MONITORING PROGRAM

TWO-WAY MODEL I ANALYSIS OF VARIANCE
COMPARING MACROINVERTEBRATE DENSITY ESTIMATES - 1981

GENERAL LINEAR MODELS PROCEDURE

DEPENDENT VARIABLE: DENSITY

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE
MODEL	17	6415596.95133428	377388.05596084
ERROR	226	130296832.26782749	576534.65605233
CORRECTED TOTAL	243	136712429.21916177	

MODEL F =	0.65		PR > F = 0.8454

R-SQUARE	C.V.	STD DEV	DENSITY MEAN
0.046928	347.2533	759.29879234	218.65846995

SOURCE	DF	TYPE I SS	F VALUE	PR > F
STATION	5	3551282.05424764	1.23	0.2944
SEASON	2	569996.97655931	0.49	0.6106
STATION*SEASON	10	2294317.92012732	0.40	0.9467

RIO BLANCO OIL SHALE COMPANY
AQUATIC ECOLOGY MONITORING PROGRAM

ONE-WAY MODEL I ANALYSIS OF VARIANCE
COMPARING MACROINVERTEBRATE DENSITY ESTIMATES
AT EACH STATION SAMPLED IN 1981
STATION=CORRAL GULCH - 1

GENERAL LINEAR MODELS PROCEDURE

CLASS LEVEL INFORMATION

CLASS	LEVELS	VALUES
SEASON	3	FALL SPRING SUMMER

NUMBER OF OBSERVATIONS IN BY GROUP = 22

RIO BLANCO OIL SHALE COMPANY
AQUATIC ECOLOGY MONITORING PROGRAM

ONE-WAY MODEL I ANALYSIS OF VARIANCE
COMPARING MACROINVERTEBRATE DENSITY ESTIMATES
AT EACH STATION SAMPLED IN 1981
STATION=CORRAL GULCH - 1

GENERAL LINEAR MODELS PROCEDURE

DEPENDENT VARIABLE: DENSITY

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE
MODEL	2	1231.78649242	615.89324621
ERROR	19	30237.68219444	1591.45695760
CORRECTED TOTAL	21	31469.46868687	

MODEL F = 0.39 PR > F = 0.6843

R-SQUARE	C.V.	STD DEV	DENSITY MEAN
0.039142	168.1102	39.89306904	23.73030303

SOURCE	DF	TYPE I SS	F VALUE	PR > F
SEASON	2	1231.78649242	0.39	0.6843

RIO BLANCO OIL SHALE COMPANY
AQUATIC ECOLOGY MONITORING PROGRAM

ONE-WAY MODEL I ANALYSIS OF VARIANCE
COMPARING MACROINVERTEBRATE DENSITY ESTIMATES
AT EACH STATION SAMPLED IN 1981
STATION=YELLOW CREEK - 1

GENERAL LINEAR MODELS PROCEDURE

CLASS LEVEL INFORMATION

CLASS	LEVELS	VALUES
SEASON	3	FALL SPRING SUMMER

NUMBER OF OBSERVATIONS IN BY GROUP = 36

RIO BLANCO OIL SHALE COMPANY
AQUATIC ECOLOGY MONITORING PROGRAM

ONE-WAY MODEL I ANALYSIS OF VARIANCE
COMPARING MACROINVERTEBRATE DENSITY ESTIMATES
AT EACH STATION SAMPLED IN 1981
STATION=YELLOW CREEK - 1

GENERAL LINEAR MODELS PROCEDURE

DEPENDENT VARIABLE: DENSITY

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE
MODEL	2	434125.17166885	217062.58583442
ERROR	33	20313703.82472000	615566.78256727
CORRECTED TOTAL	35	20747828.99638885	

MODEL F =	0.35		PR > F = 0.7055

R-SQUARE	C.V.	STD DEV	DENSITY MEAN
0.020924	329.3521	784.58064121	238.21944444

SOURCE	DF	TYPE I SS	F VALUE	PR > F
SEASON	2	434125.17166885	0.35	0.7055

RIO BLANCO OIL SHALE COMPANY
AQUATIC ECOLOGY MONITORING PROGRAM

ONE-WAY MODEL I ANALYSIS OF VARIANCE
COMPARING MACROINVERTEBRATE DENSITY ESTIMATES
AT EACH STATION SAMPLED IN 1981
STATION=YELLOW CREEK - 2

GENERAL LINEAR MODELS PROCEDURE

CLASS LEVEL INFORMATION

CLASS	LEVELS	VALUES
SEASON	3	FALL SPRING SUMMER

NUMBER OF OBSERVATIONS IN BY GROUP = 45

RIO BLANCO OIL SHALE COMPANY
AQUATIC ECOLOGY MONITORING PROGRAM

ONE-WAY MODEL I ANALYSIS OF VARIANCE
COMPARING MACROINVERTEBRATE DENSITY ESTIMATES
AT EACH STATION SAMPLED IN 1981
STATION=YELLOW CREEK - 2

GENERAL LINEAR MODELS PROCEDURE

DEPENDENT VARIABLE: DENSITY

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE
MODEL	2	1861683.42543590	930841.71271795
ERROR	42	75832680.53589735	1805540.01275946
CORRECTED TOTAL	44	77694363.96133325	

MODEL F = 0.52 PR > F = 0.6009

R-SQUARE	C.V.	STD DEV	DENSITY MEAN
0.023962	303.5277	1343.70384116	442.69555556

SOURCE	DF	TYPE I SS	F VALUE	PR > F
SEASON	2	1861683.42543590	0.52	0.6009

RIO BLANCO OIL SHALE COMPANY
AQUATIC ECOLOGY MONITORING PROGRAM

ONE-WAY MODEL I ANALYSIS OF VARIANCE
COMPARING MACROINVERTEBRATE DENSITY ESTIMATES
AT EACH STATION SAMPLED IN 1981
STATION=YELLOW CREEK - 3

GENERAL LINEAR MODELS PROCEDURE

CLASS LEVEL INFORMATION

CLASS	LEVELS	VALUES
SEASON	3	FALL SPRING SUMMER

NUMBER OF OBSERVATIONS IN BY GROUP = 37

RIO BLANCO OIL SHALE COMPANY
AQUATIC ECOLOGY MONITORING PROGRAM

ONE-WAY MODEL I ANALYSIS OF VARIANCE
COMPARING MACROINVERTEBRATE DENSITY ESTIMATES
AT EACH STATION SAMPLED IN 1981
STATION=YELLOW CREEK - 3

GENERAL LINEAR MODELS PROCEDURE

DEPENDENT VARIABLE: DENSITY

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE
MODEL	2	58136.73205907	29068.36602954
ERROR	34	4343836.01202501	127759.88270662
CORRECTED TOTAL	36	4401972.74408408	

MODEL F = 0.23 PR > F = 0.7977

R-SQUARE	C.V.	STD DEV	DENSITY MEAN
0.013207	256.7665	357.43514476	139.20630631

SOURCE	DF	TYPE I SS	F VALUE	PR > F
SEASON	2	58136.73205907	0.23	0.7977

RIO BLANCO OIL SHALE COMPANY
AQUATIC ECOLOGY MONITORING PROGRAM

ONE-WAY MODEL I ANALYSIS OF VARIANCE
COMPARING MACROINVERTEBRATE DENSITY ESTIMATES
AT EACH STATION SAMPLED IN 1981
STATION=WHITE RIVER - 1

GENERAL LINEAR MODELS PROCEDURE

CLASS LEVEL INFORMATION

CLASS	LEVELS	VALUES
SEASON	3	FALL SPRING SUMMER

NUMBER OF OBSERVATIONS IN BY GROUP = 48

RIO BLANCO OIL SHALE COMPANY
AQUATIC ECOLOGY MONITORING PROGRAM

ONE-WAY MODEL I ANALYSIS OF VARIANCE
COMPARING MACROINVERTEBRATE DENSITY ESTIMATES
AT EACH STATION SAMPLED IN 1981
STATION=WHITE RIVER - 1

GENERAL LINEAR MODELS PROCEDURE

DEPENDENT VARIABLE: DENSITY

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE
MODEL	2	426645.35129784	213322.67564892
ERROR	45	22156491.24256788	492366.47205706
CORRECTED TOTAL	47	22583136.59386572	

MODEL F =	0.43		PR > F = 0.6511

R-SQUARE	C.V.	STD DEV	DENSITY MEAN
0.018892	325.1515	701.68830121	215.80347222

SOURCE	DF	TYPE I SS	F VALUE	PR > F
SEASON	2	426645.35129784	0.43	0.6511

RIO BLANCO OIL SHALE COMPANY
AQUATIC ECOLOGY MONITORING PROGRAM

ONE-WAY MODEL I ANALYSIS OF VARIANCE
COMPARING MACROINVERTEBRATE DENSITY ESTIMATES
AT EACH STATION SAMPLED IN 1981
STATION=WHITE RIVER - 2

GENERAL LINEAR MODELS PROCEDURE

CLASS LEVEL INFORMATION

CLASS	LEVELS	VALUES
SEASON	3	FALL SPRING SUMMER

NUMBER OF OBSERVATIONS IN BY GROUP = 56

RIO BLANCO OIL SHALE COMPANY
AQUATIC ECOLOGY MONITORING PROGRAM

ONE-WAY MODEL I ANALYSIS OF VARIANCE
COMPARING MACROINVERTEBRATE DENSITY ESTIMATES
AT EACH STATION SAMPLED IN 1981
STATION=WHITE RIVER - 2

GENERAL LINEAR MODELS PROCEDURE

DEPENDENT VARIABLE: DENSITY

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE
MODEL	2	82492.43013255	41246.21506628
ERROR	53	7619882.97042300	143771.37680043
CORRECTED TOTAL	55	7702375.40055555	

MODEL F =	0.29		PR > F = 0.7518

R-SQUARE	C.V.	STD DEV	DENSITY MEAN
0.010710	240.6295	379.17196204	157.57500000

SOURCE	DF	TYPE I SS	F VALUE	PR > F
SEASON	2	82492.43013255	0.29	0.7518

APPENDIX 5-O

Hydrology Studies

APPENDIX 5-1

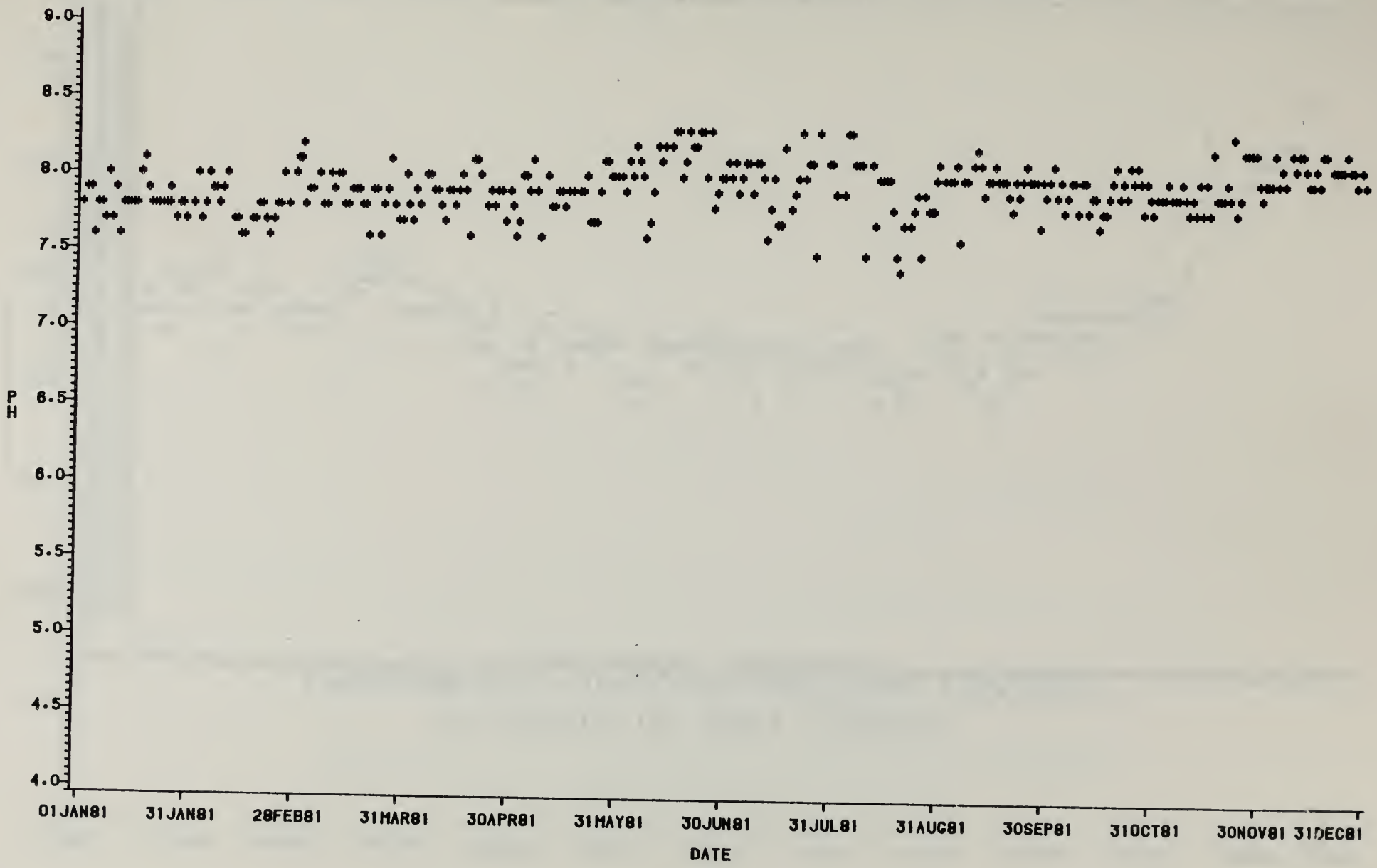
Hydrology Monitoring Data
Dewatering/Reinjection/Discharge Program

APPENDIX 5-1.1

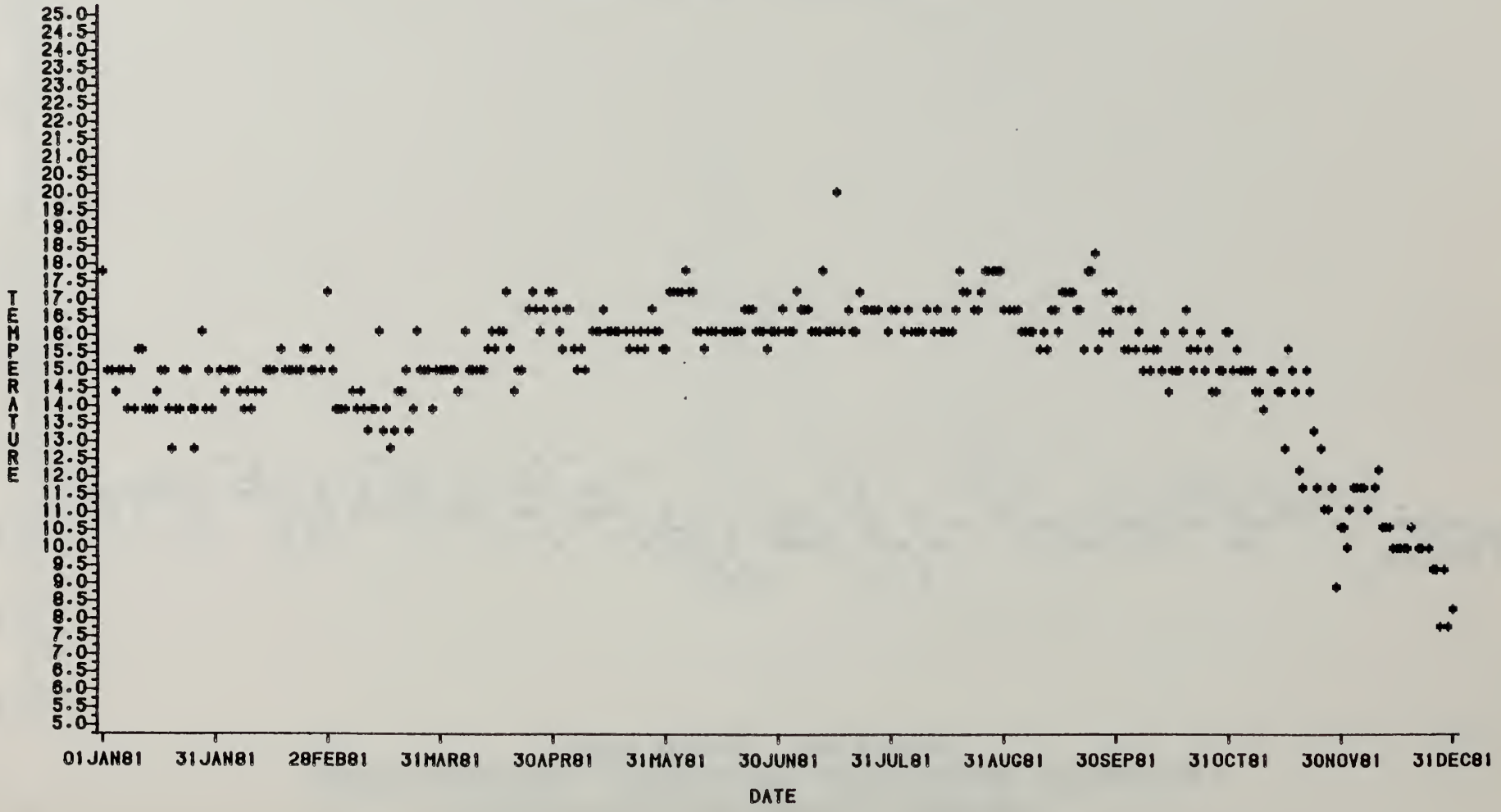
Operations Data for the Dewatering/Reinjection System

RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM

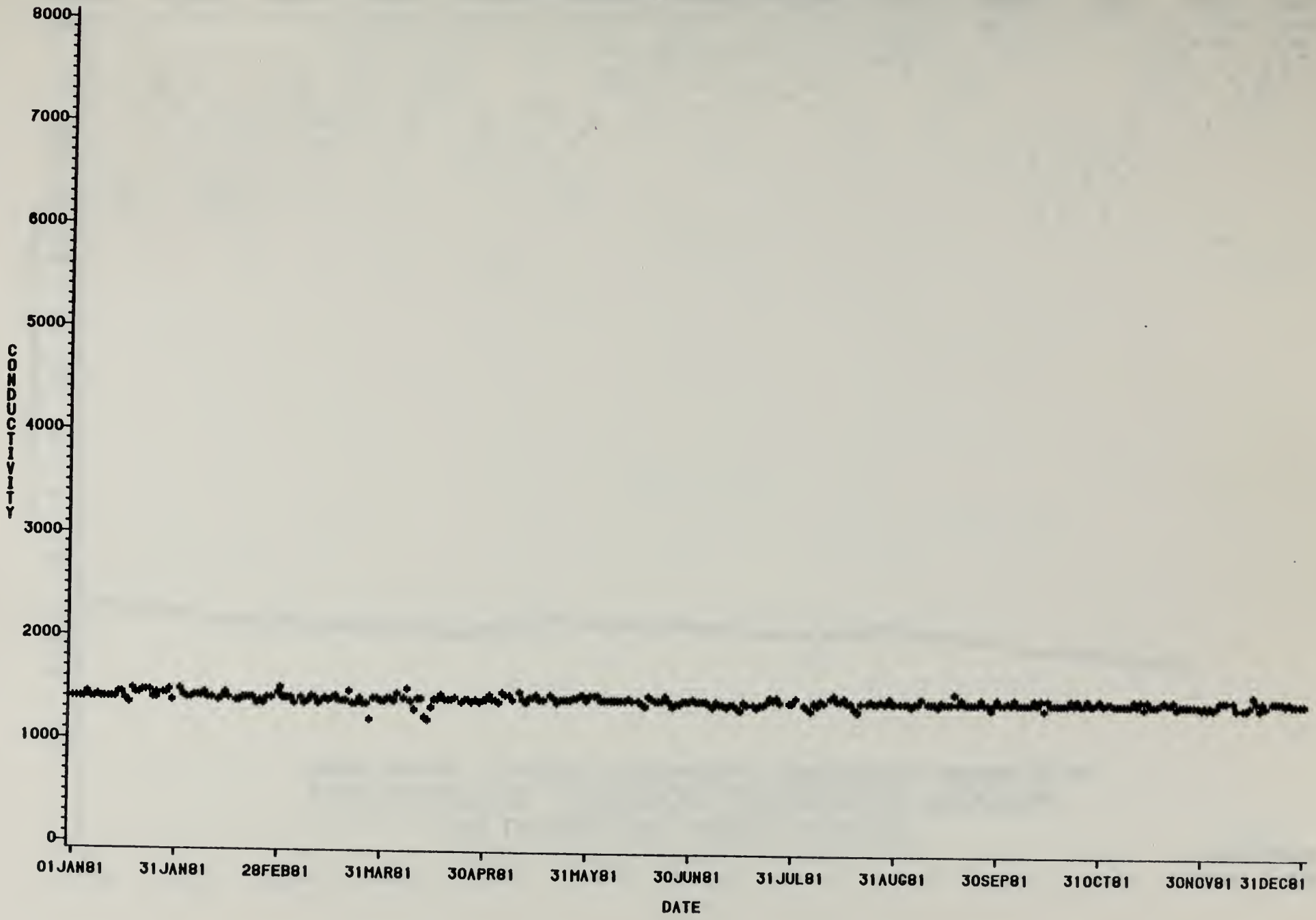
REPORT YEAR=1981 STATION=YCOINJ



RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM
REPORT YEAR=1981 STATION=YCOINJ

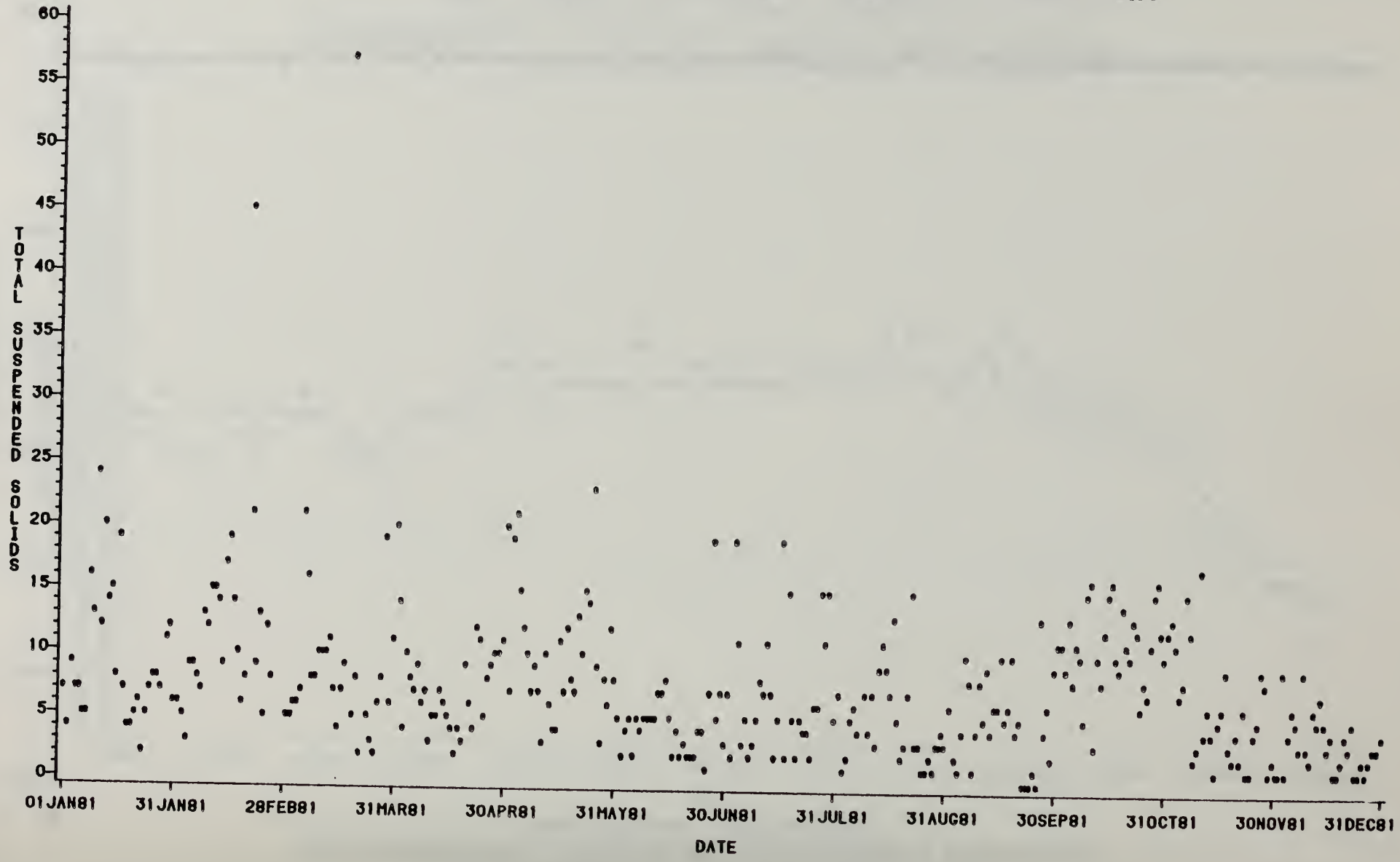


RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM
REPORT YEAR-1981 STATION-YCOINJ

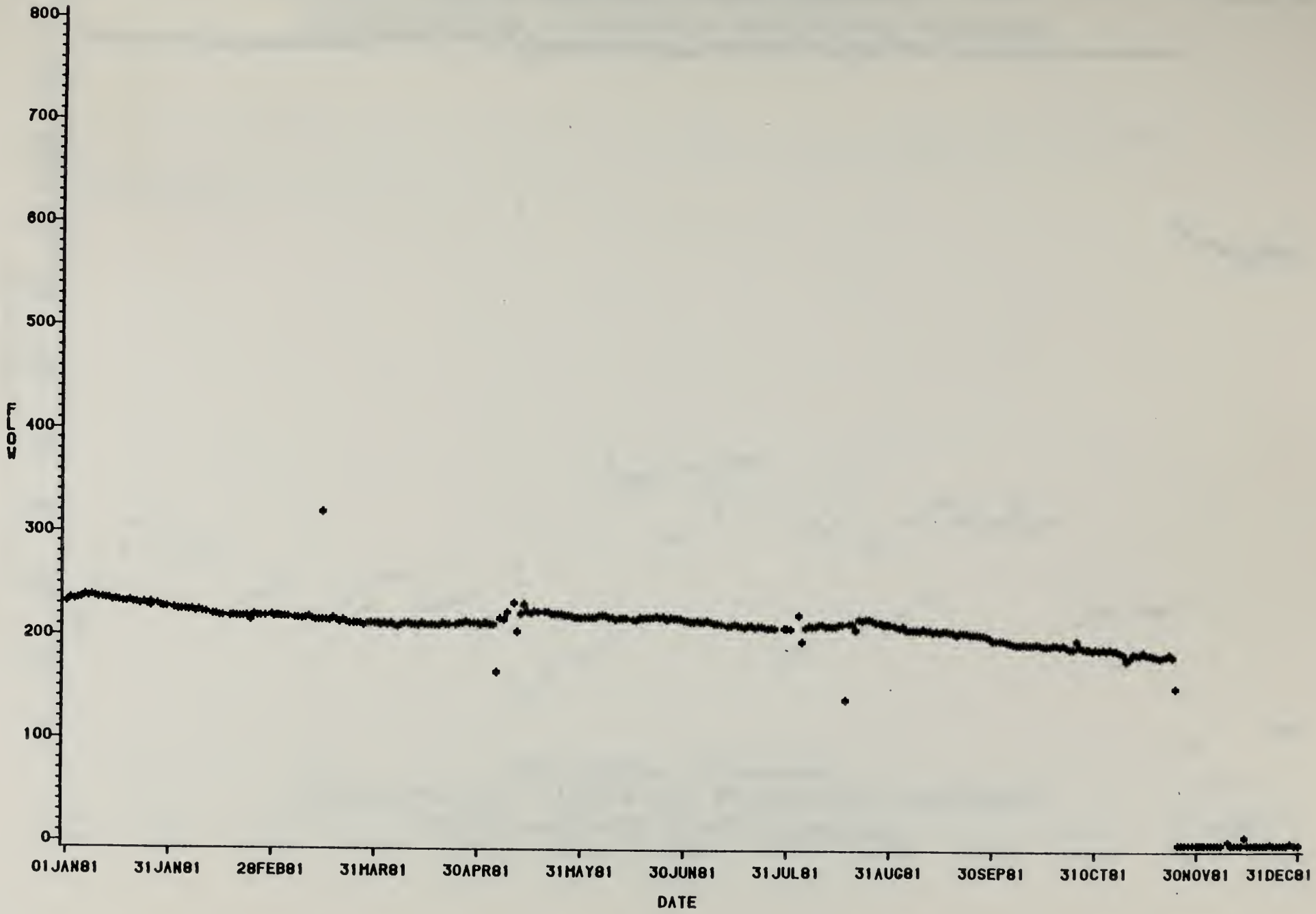


RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM

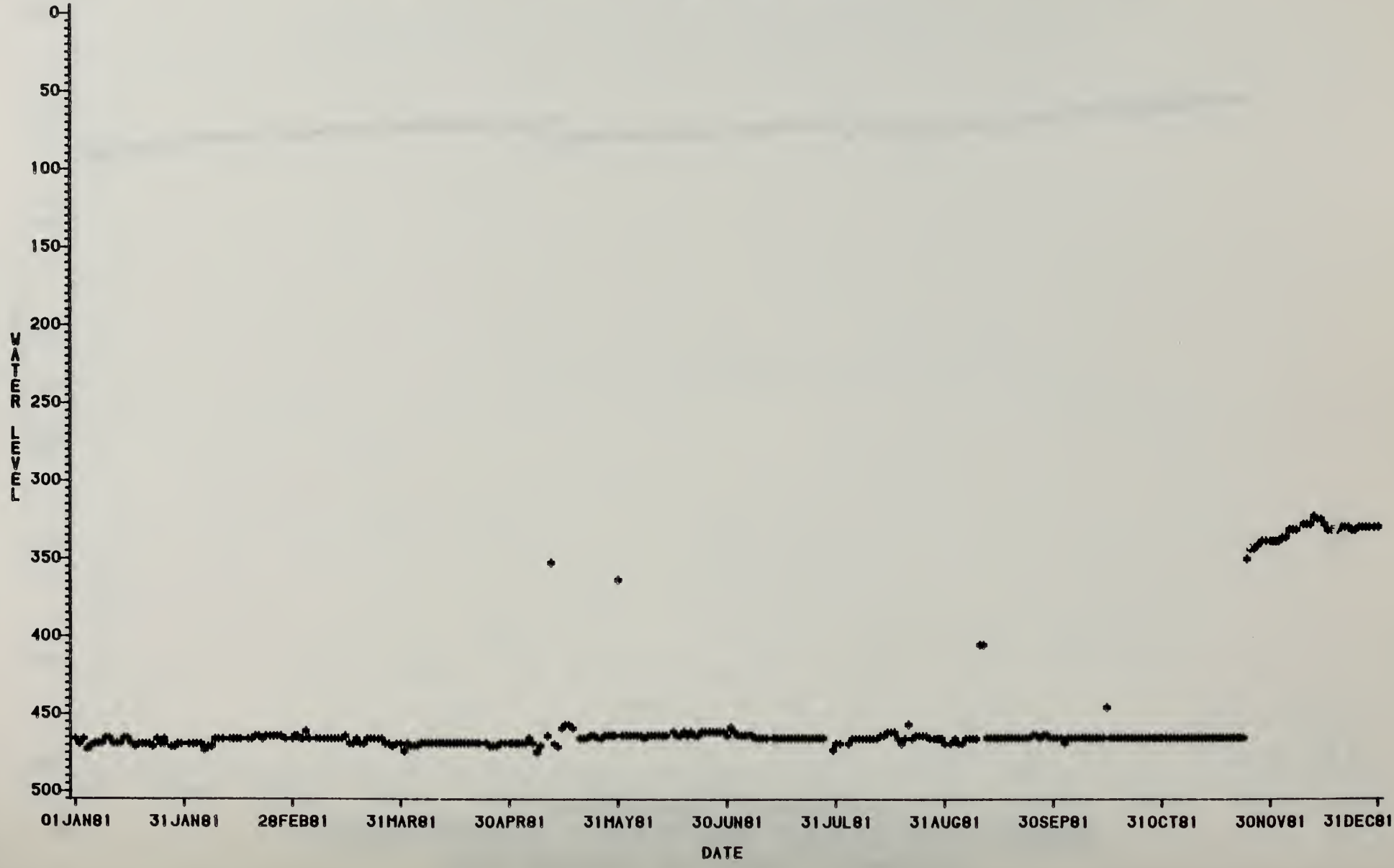
REPORT YEAR=1981 TYPE=DAMS STATION=YCOINJ PARAMETER=TOTAL SUSPENDED SOLIDS



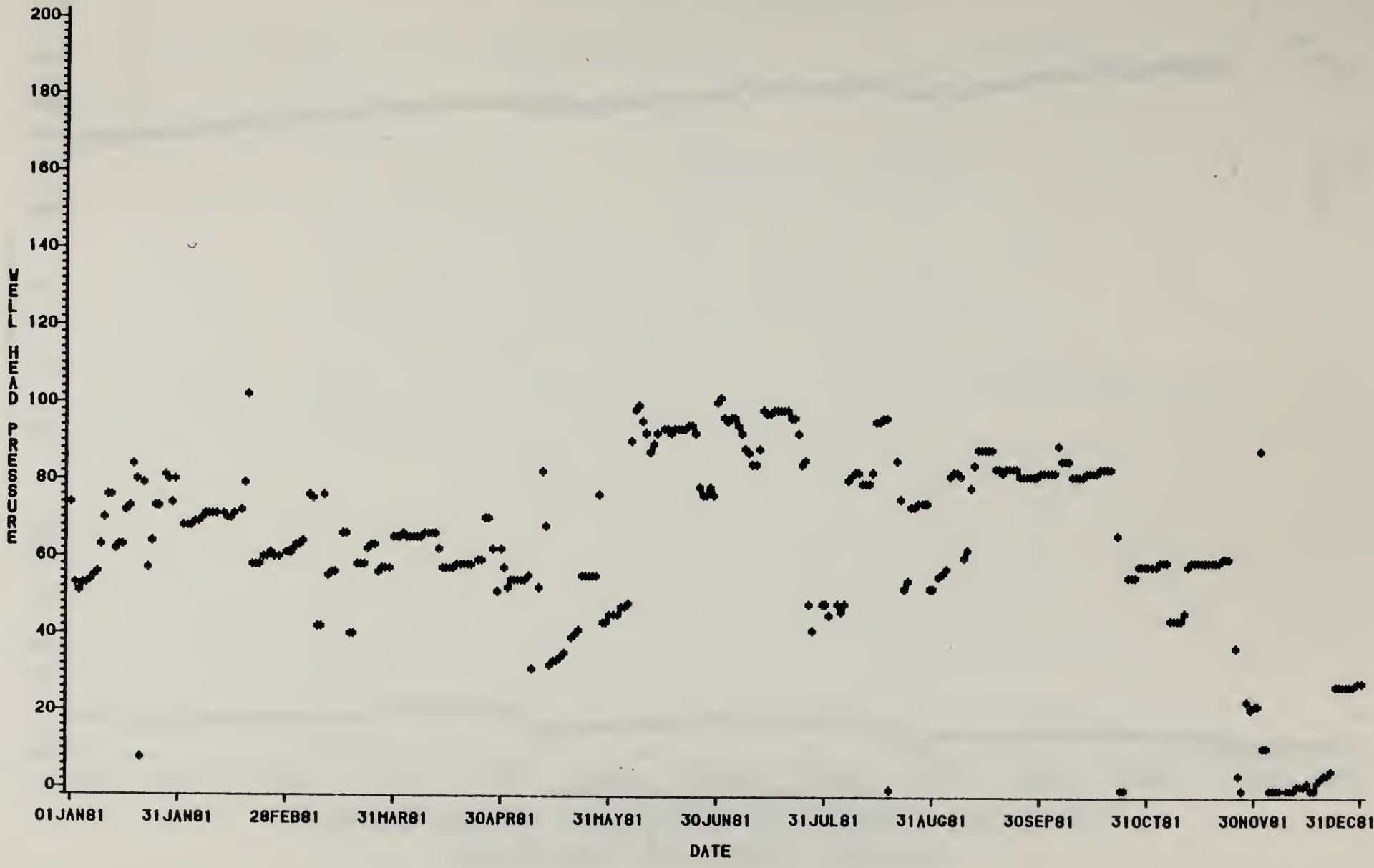
RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM
REPORT YEAR=1981 STATION=GS-D6U



RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM
REPORT YEAR=1981 STATION=GS-D6U

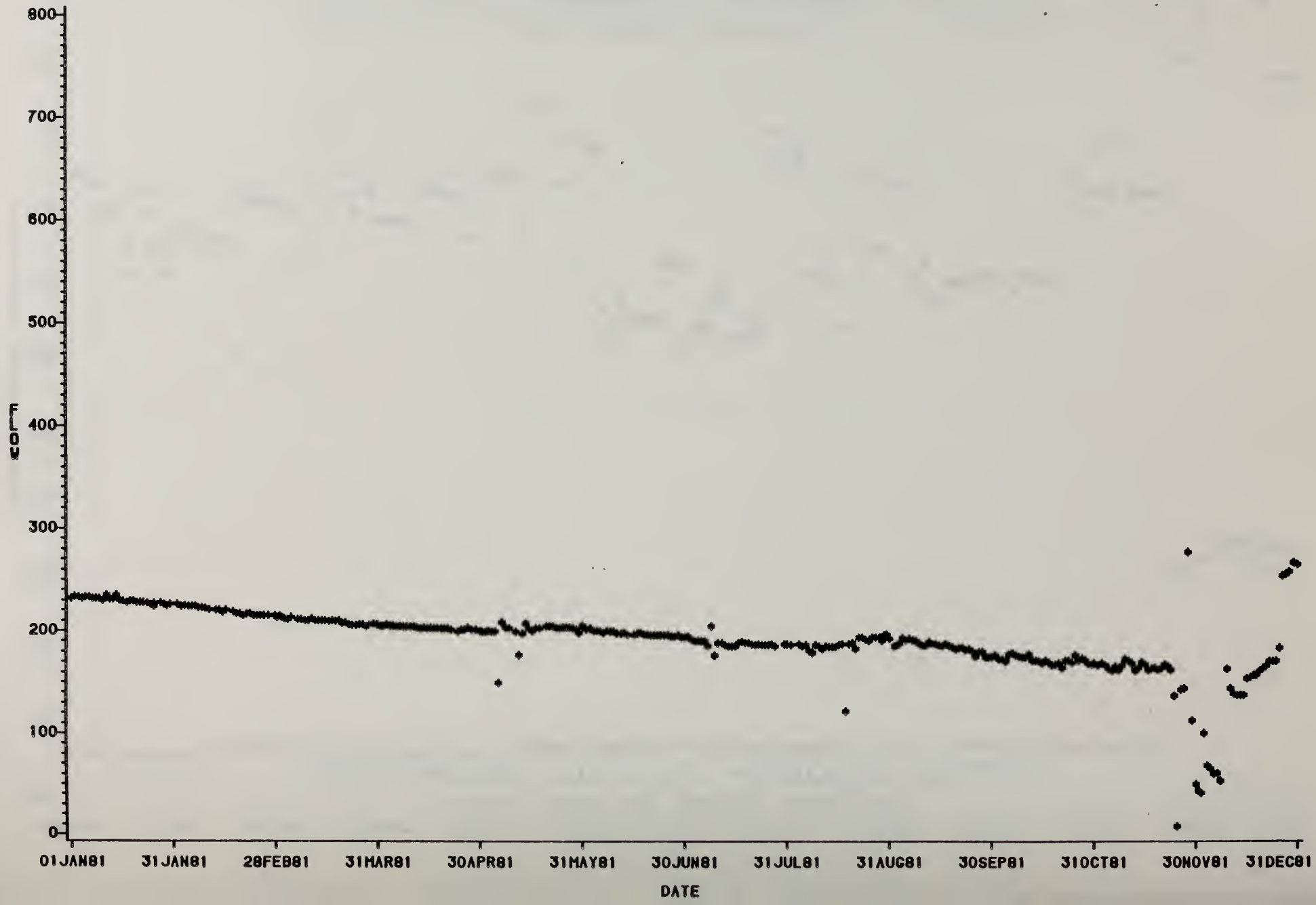


RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM
REPORT YEAR=1981 STATION=CS-6U



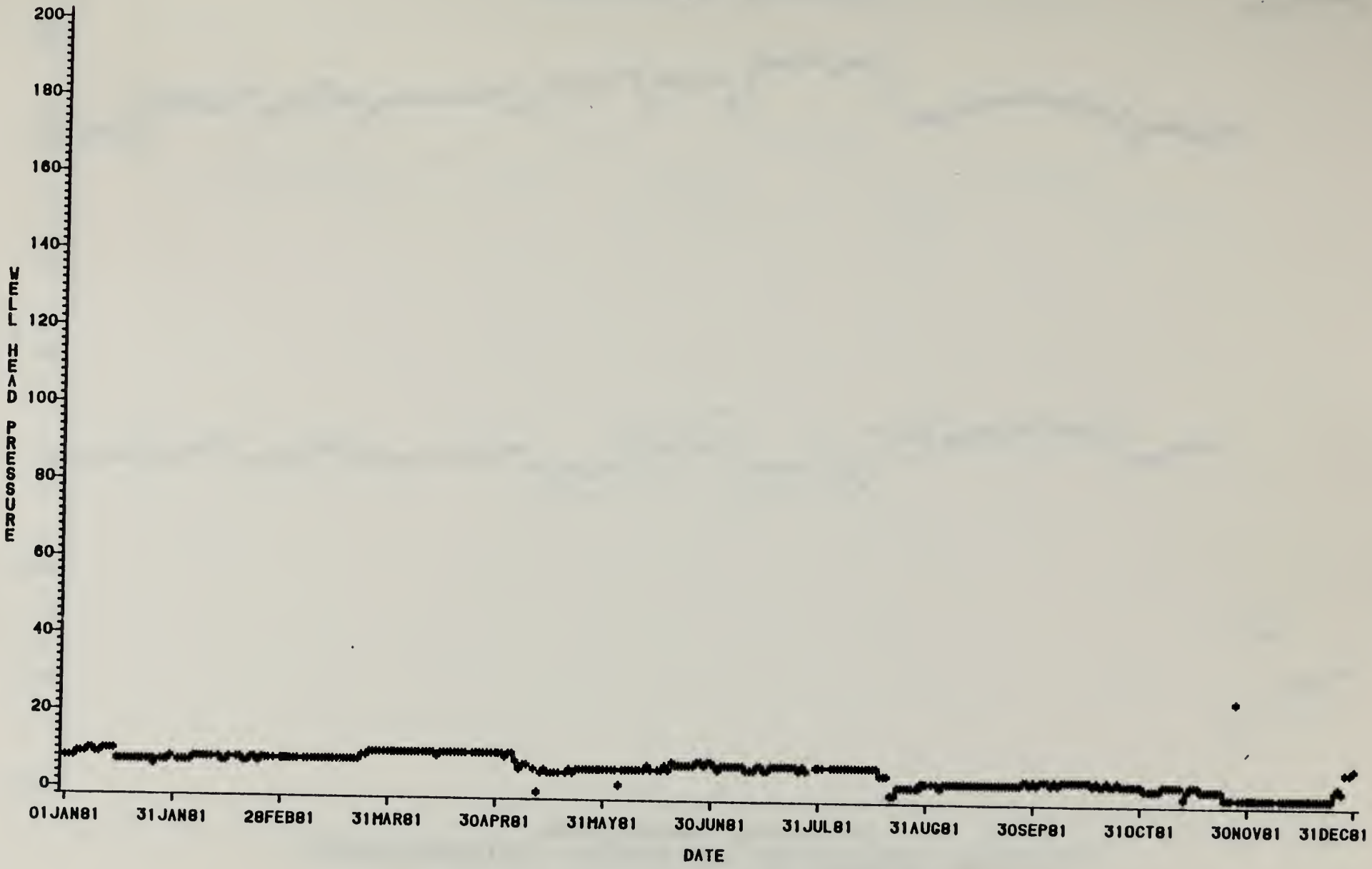
RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM

REPORT YEAR=1981 STATION=TO-2U



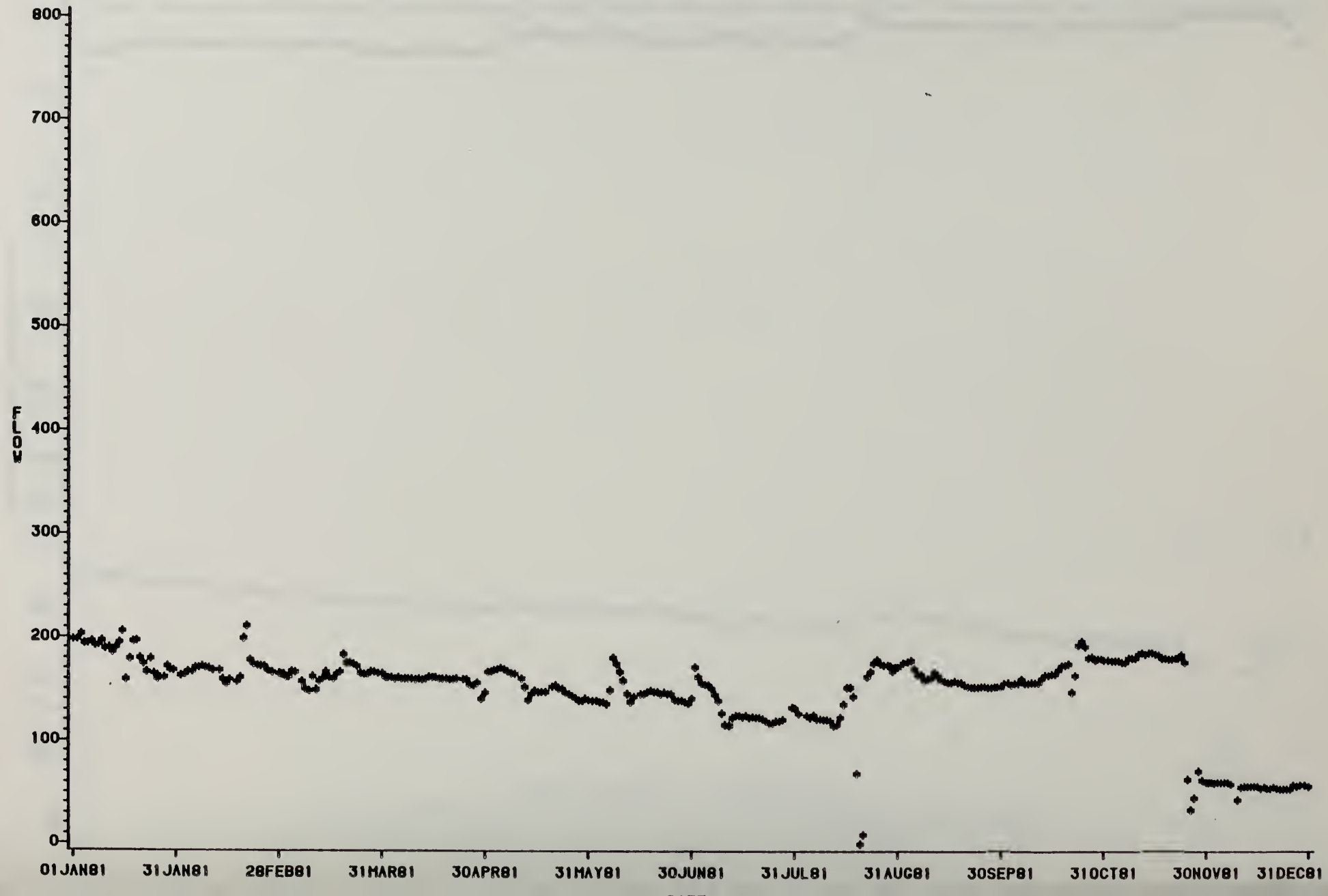
RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM

REPORT YEAR=1981 STATION=TO-2U



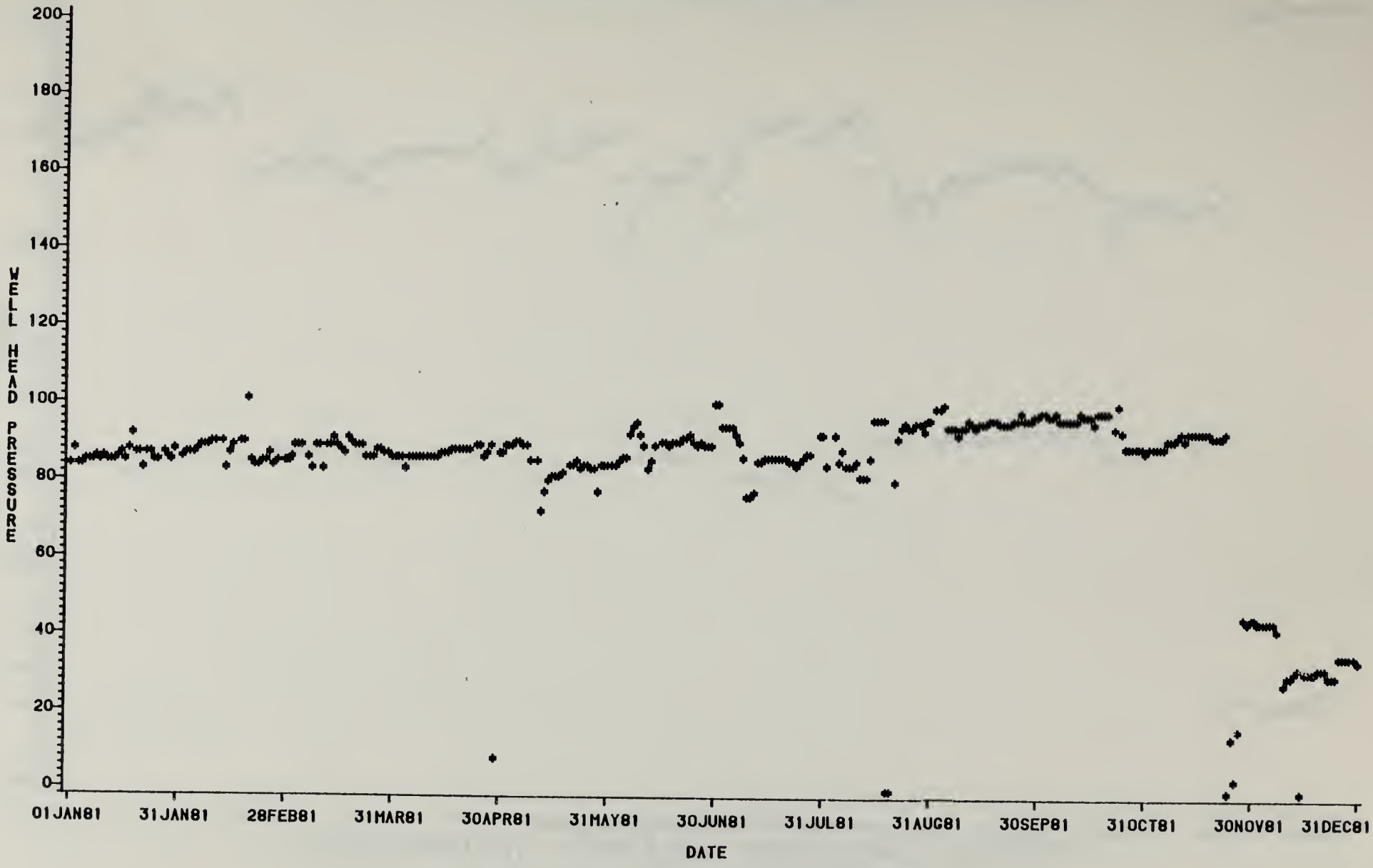
RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM

REPORT YEAR=1981 STATION=TO-3U

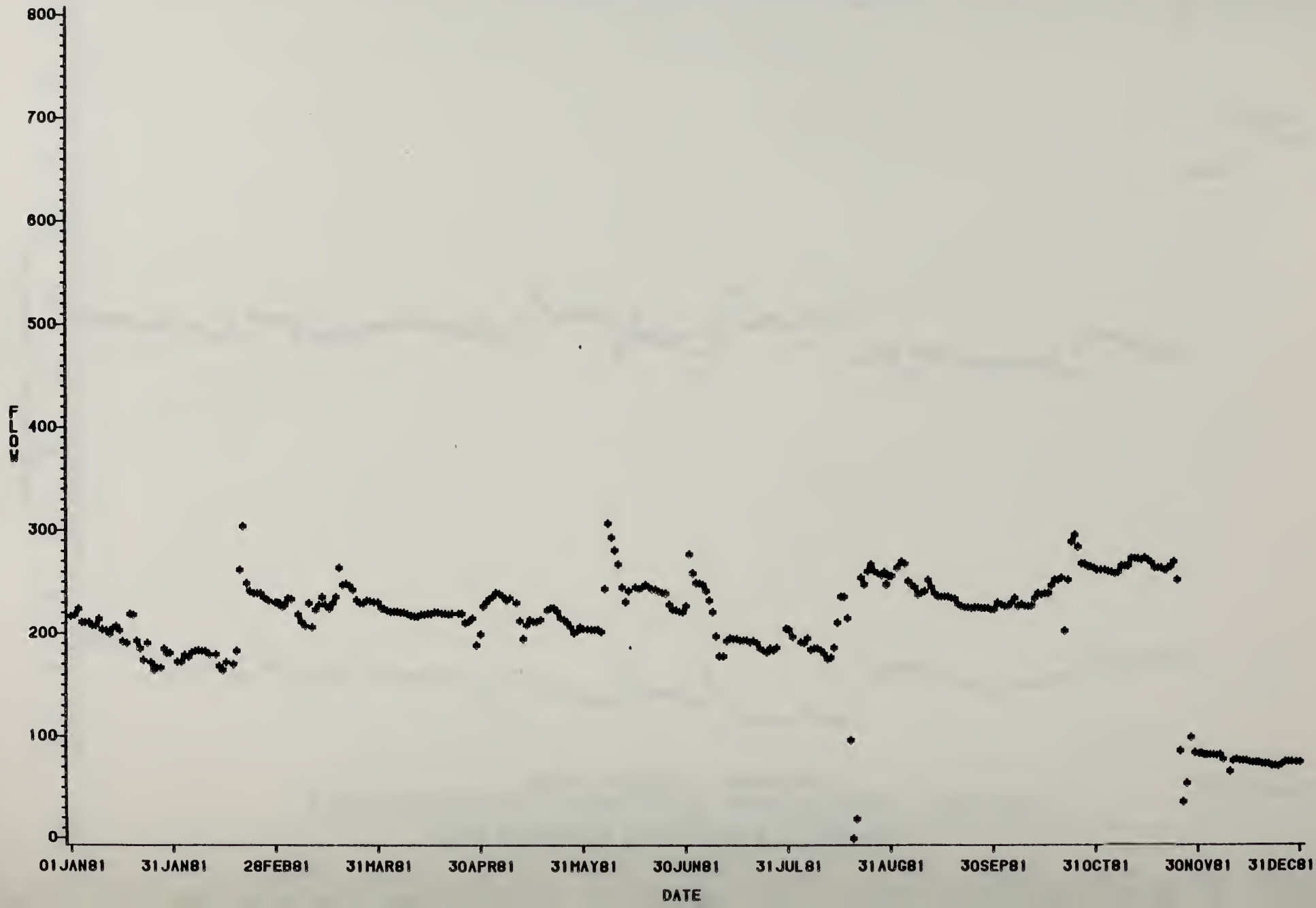


RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM

REPORT YEAR=1981 STATION=TO-3U

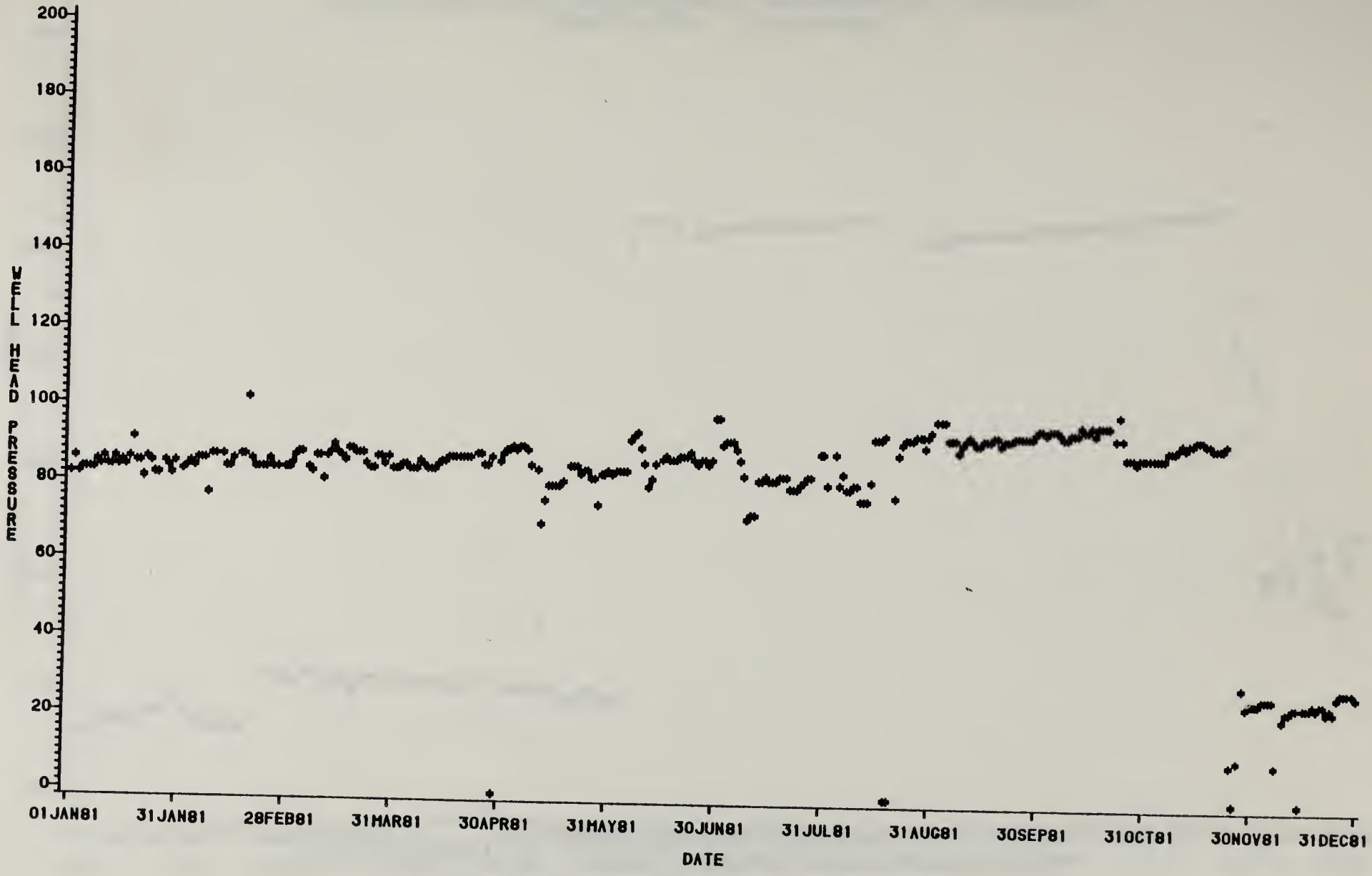


RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM
REPORT YEAR=1981 STATION=GS-4-5U

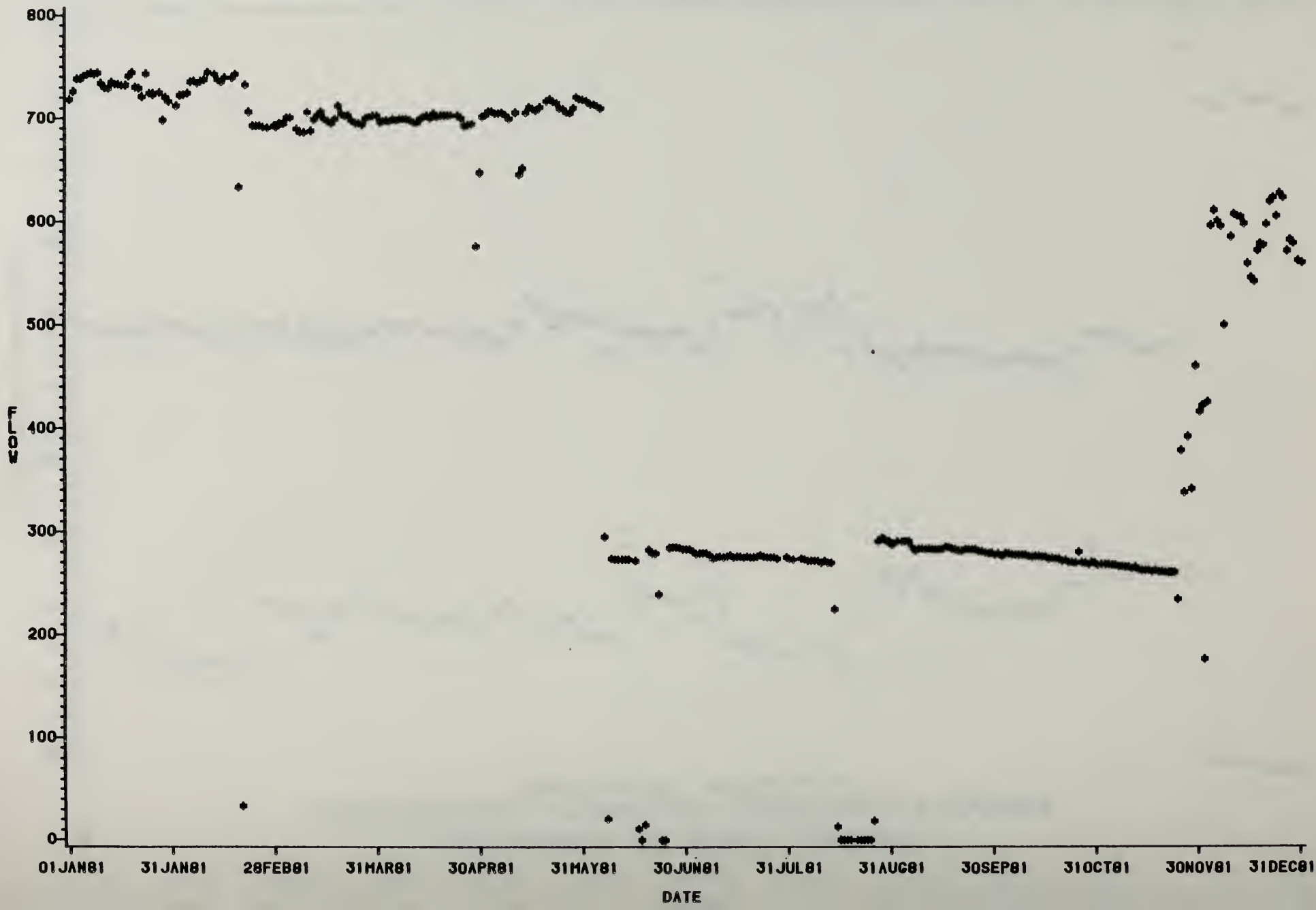


RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM

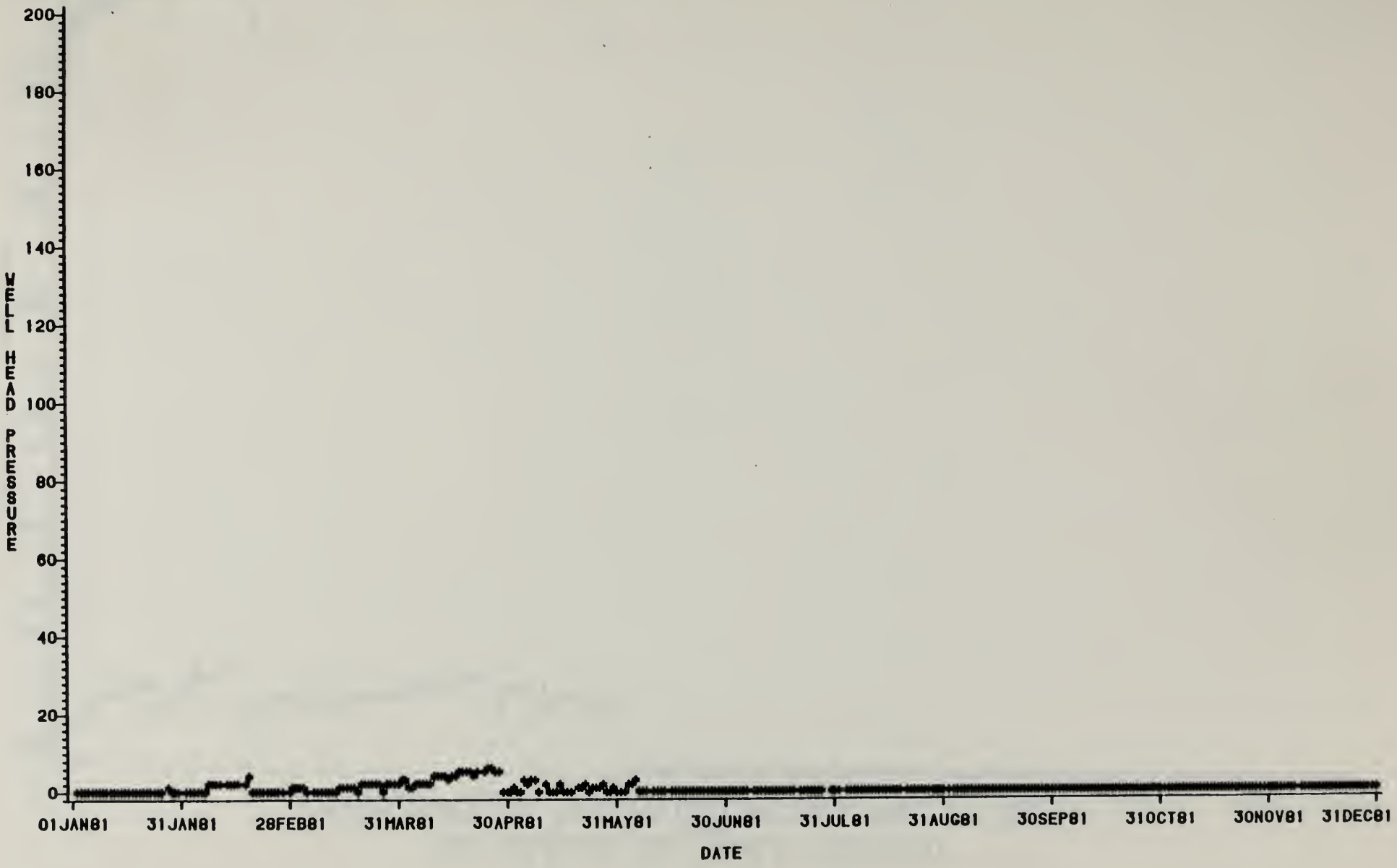
REPORT YEAR=1981 STATION=CS-4-5U



RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM
REPORT YEAR=1981 STATION=GS-20U

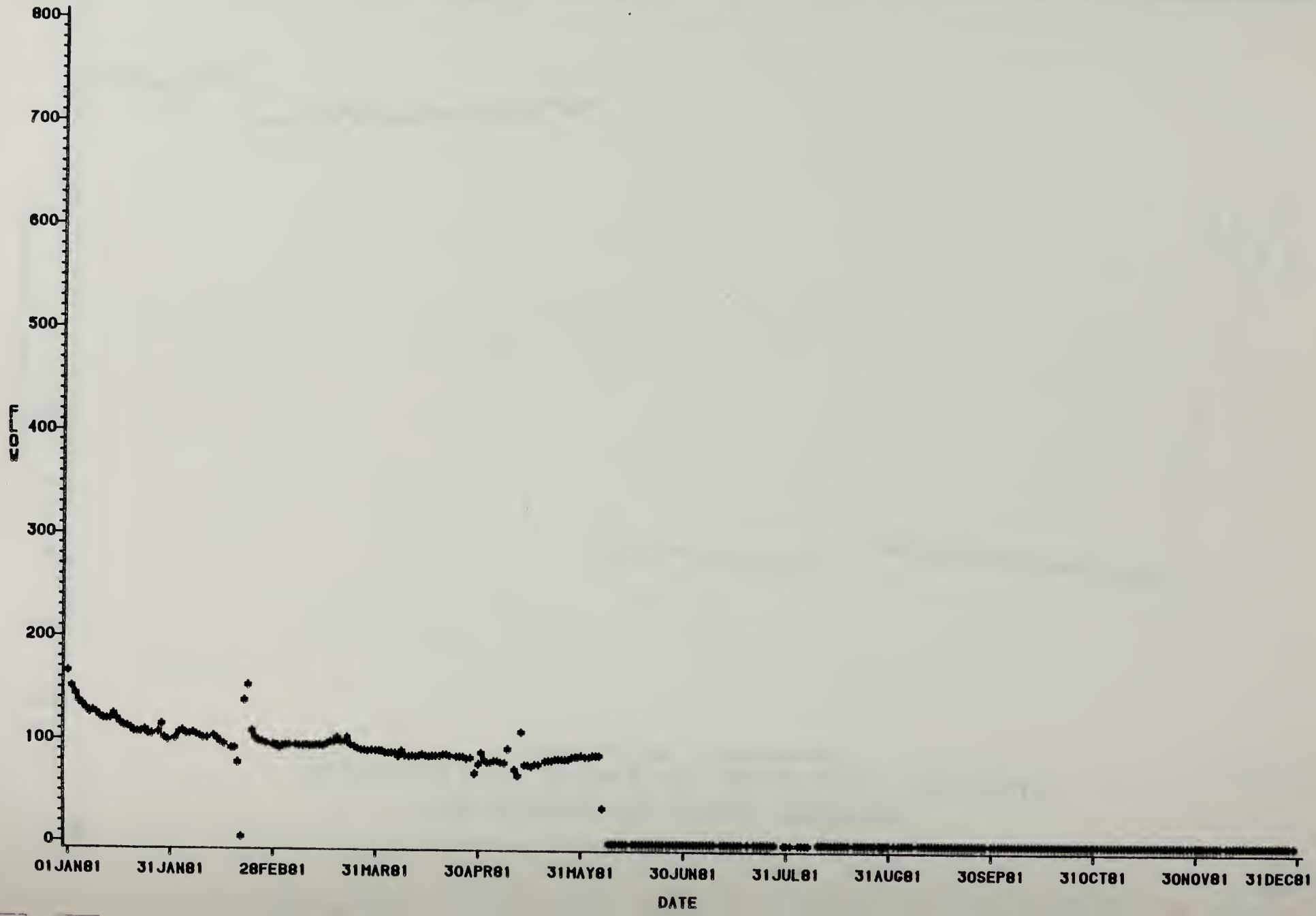


RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM
REPORT YEAR=1981 STATION=GS-20U



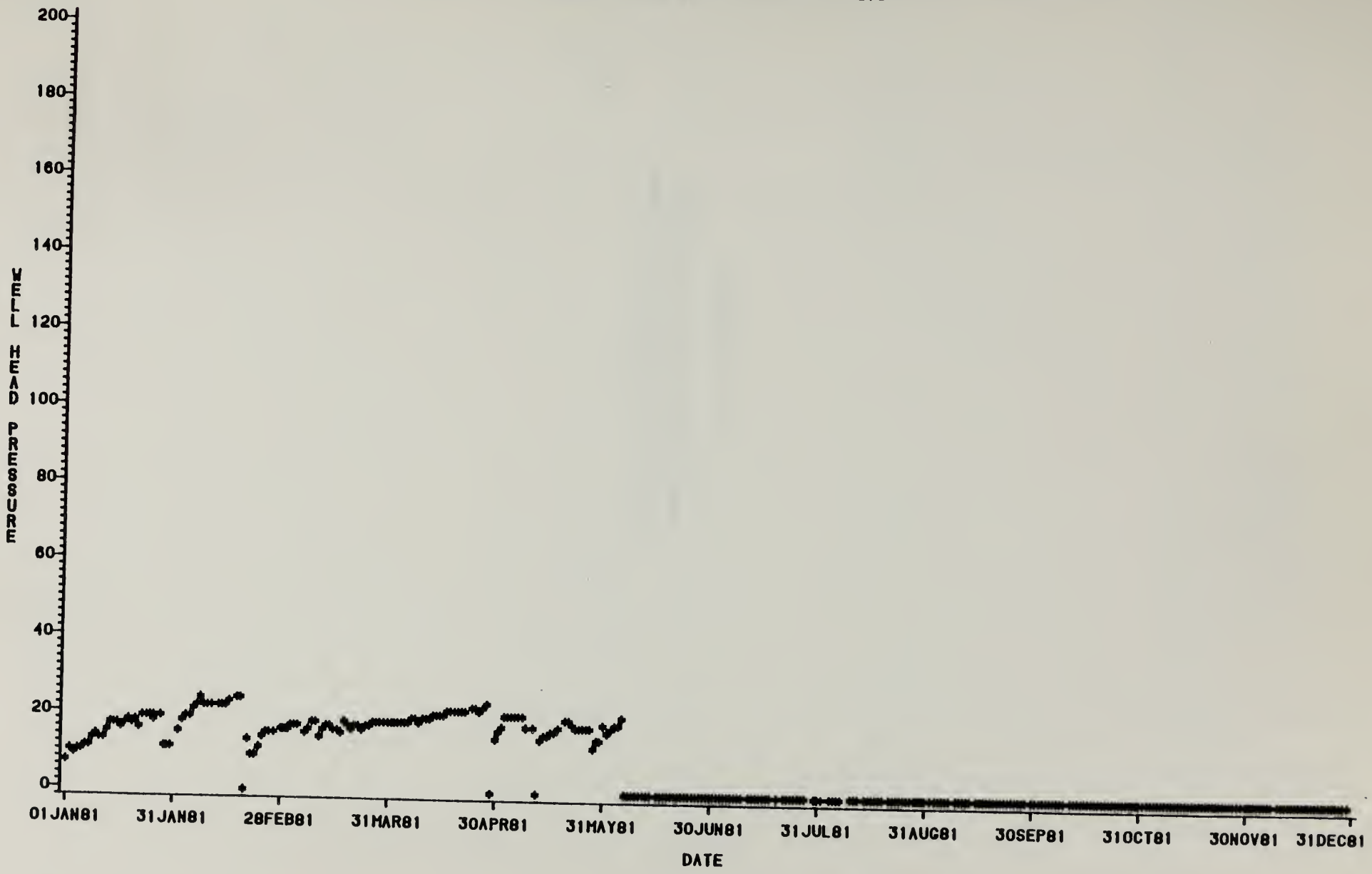
RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM

REPORT YEAR=1981 STATION=GS-21U



RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM

REPORT YEAR=1981 STATION=CS-21U



APPENDIX 5-1.2

Operations Water Quality Data
Dewatering/Reinjection/Discharge
Program

RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM
WATER CHEMISTRY DATA - TRACT C-A
OPERATIONS WATER QUALITY DATA - DEWATERING/REINJECTION/DISCHARGE

---------- REPORT YEAR=1981 TYPE=DAMS STATION=YCOINJ ----------

OBS	DATE	TEMP	PH	SPCND	WAL	AAL	AAS	BAA	BAE	BB	BBR	CCD	CCA	CCL
1	30JAN81	14.0	7.7	1375	.	0.1	0.01	0.1	0.01	0.24	0.2	0.01	44	5.19
2	31MAR81	15.0	7.7	1375	.	.	.	.	.	.	.	.	41	8.18
3	07MAY81	15.5	7.7	1500	.	.	.	.	.	0.27	.	.	39	8.29

OBS	CCR	CCU	F	FE	PB	LI	MG	MN	HG	NI	K	SE	AG	NA	SR
1	0.01	0.01	0.29	0.07	0.1	0.12	77	0.01	0.3	0.05	0.39	0.01	.	210	5.2
2	.	.	0.52	0.06	.	.	78	.	.	.	0.42	.	.	190	.
3	.	.	0.62	.	.	.	76	.	.	.	0.44	.	.	190	.

RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM
WATER CHEMISTRY DATA - TRACT C-A
OPERATIONS WATER QUALITY DATA - DEWATERING/REINJECTION/DISCHARGE

---------- REPORT YEAR=1981 TYPE=DAMS STATION=YCOINJ ----------

OBS	V	ZN	SB	BI	GA	GE	MOL	SN	TI	W	ZR	HCO3	CO3	H	SO4	SO3	S	TSS	TCN	TSO4
1	0.5	0.01	.	0.01	0.5	0.1	0.1	.	0.5	.	10	563	1	0.5	387	.	0.1	.	.	.
2	.	.	.	.	.	.	.	.	.	.	.	561	.	.	388	.	.	.	.	.
3	.	.	.	.	.	.	.	.	.	.	.	578	.	.	356	.	.	.	.	.

OBS	TDS	ALK	HARD	PC4	NH3	NO2	NO3	TCC	DCN	PHE	OG	BOD	COD	SI02	KJEL	ORTHP	ALPHA	BETA
1	1056	491	427	0.16	0.80	25.000	0.5	. 7	0.05	0.01	.	.	24	28	.	.	3	6
2	1032	479	423	0.10	0.10	0.017	0.3	. 8	.	.	.	.	.	29	.	.	.	.
3	1052	498	410	.	0.62	0.007	0.3	. 2	.	.	.	.	.	30	.	.	.	.

RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM
WATER CHEMISTRY DATA - TRACT C-A
OPERATIONS WATER QUALITY DATA - DEWATERING/REINJECTION/DISCHARGE

---------- REPORT YEAR=1981 TYPE=UPPA STATION=GS-D6U ----------

OBS	DATE	TEMP	PH	SPCOND	WL	ALS	ABE	BB	BR	CDA	CL	CRU	F	FE	PB	LI
4	29JAN81	16.5	7.6	1350	.	.	.	0.26	.	.	57	5.97	.	0.18	0.14	.	.
5	24MAR81	17.2	7.7	1350	.	.	.	.	.	.	.	.	.	.	.	.	.
6	05MAY81	17.0	7.5	1400	.	.	.	0.24	0.8	.	44	7.28	.	0.11	.	.	0.12
7	19AUG81	17.0	7.4	1320	.	.	.	0.19	.	.	44	9.13	.	0.80	.	.	.
8	11NOV81	17.1	7.8	1375	.	.	.	0.31	.	.	44	8.64	.	0.81	.	.	0.11

OBS	MMG	MN	HG	NI	K	SE	AG	NA	SR	V	ZN	SB	MOL	STNI	WR	HCO3	CO3	OH	SO4	SO3
4	86	.	.	.	0.25	.	.	190	.	.	.	.	.	.	.	521	1	0.5	443	.
5	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	508	.	.	.	.
6	56	.	.	.	0.30	.	.	210	5.50	.	.	.	.	.	.	527	.	.	263	.
7	57	.	7.9	.	0.31	.	.	217	.	.	.	.	.	.	.	508	.	.	345	.
8	58	.	.	.	0.28	.	.	200	5.02	.	0.01	.	.	.	.	513	.	.	319	.

OBS	S	TSS	TSCN	TSTO4	TDS	ALK	HARD	PO4	NH3	NO2	NO3	TOC	DOC	N	PHE	HOG	BOD	COD	SI O2	KJEL	CRTHP	ALPHA	BETA
4	.	.	.	.	1012	446	496	0.01	1.40	11.000	0.2	.	5	.	.	.	.	.	34	.	.	.	.
5	.	.	.	0	.	449	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
6	41	.	.	.	940	451	340	.	0.07	0.061	0.2	.	1	.	0	.	.	6	32	.	.	2	4
7	.	878	.	.	1054	434	344	0.02	0.15	.	0.2	.	.	.	.	.	.	.	27	.	.	.	.
8	.	.	.	.	950	442	348	0.05	0.15	.	0.2	.	4	.	.	.	.	.	31	.	.	5	2

RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM
WATER CHEMISTRY DATA - TRACT C-A
OPERATIONS WATER QUALITY DATA - DEWATERING/REINJECTION/DISCHARGE

---------- REPORT YEAR=1981 TYPE=UPPA STATION=GS-08U ----------

OBS	DATE	TEMP	PH	SPC COND	WL	AL	AS	BA	BE	B	BR	CD	CA	CL	CR	CU
9	29JAN81	15.0	7.3	1400	.	.	.	.	.	0.17	.	.	57	22.90	.	.
10	24MAR81	15.0	7.7	1550	.	.	.	.	.	.	.	.	.	.	.	.
11	05MAY81	15.0	8.1	1450	.	.	.	.	.	0.38	0.9	.	53	10.60	.	.
12	11NOV81	14.8	7.7	1475	.	.	.	.	.	0.37	.	.	53	9.25	.	.

OBS	F	FE	PB	LI	MG	MN	HG	NI	K	SE	AG	NA	SR	V	ZN	SB
9	0.21	0.14	.	.	90	.	.	.	0.25	.	.	190	.	.	.	.
10	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
11	0.27	0.20	.	0.10	83	0.04	.	.	0.49	.	.	205	5.20	.	.	.
12	0.94	.	.	0.09	90	0.02	.	.	0.26	.	.	180	4.51	.	0.05	.

RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM
WATER CHEMISTRY DATA - TRACT C-A
OPERATIONS WATER QUALITY DATA - DEWATERING/REINJECTION/DISCHARGE

---------- REPORT YEAR=1981 TYPE=UPPA STATION=GS-C8U ----------

BI	GA	GE	ML	NS	TI	W	ZR	HCO3	CO3	OH	SO4	SO3	S	TSS	TSCN	TSO4	TDS	ALK	HARD
.	.	.	.	.	.	.	.	665	1	0.5	391	.	.	.	.	.	1120	566	513
.	.	.	.	.	.	.	.	649	.	.	.	.	.	.	.	0	.	555	.
.	.	.	.	.	.	.	.	674	.	.	370	.	5.7	.	.	.	1064	572	473
.	.	.	.	.	.	.	.	644	.	.	360	.	.	.	.	.	1085	549	502

PG4	NH3	NO2	NO3	TOC	DOC	CN	PHE	OG	BOD	COD	SIO2	KJEL	ORTHOP	ALPHA	BETA
0.11	1.40	1.00	0.1	.	16	.	.	.	.	.	34	.	.	.	.
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
.	0.09	0.01	0.0	.	3	.	0.1	.	.	16	36	.	.	2	2
0.07	2.29	.	.	.	6	.	.	.	.	.	35	.	.	0	1

APPENDIX 5-1.3

Springs and Seeps Data
Water Quality Data

RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM
WATER CHEMISTRY DATA - TRACT C-A
SPRINGS AND SEEPS DATA

---------- REPORT YEAR=1981 TYPE=SEEP STATION=SPG-MILL ----------

OBS	DATE	TEMP	PH	SPCOND	ALK	ALS	ASE	BOR	BRD	CAL	CLR	CRU	FE	PB	LI
1	24MAR81	9.7	7.2	1750	.	.	.	.	.	.	.	.	.	.	.
2	11NOV81	10.2	7.5	1775	.	.	.	.	.	0.45	.	.	100	20.4	.	.	0.36	.	.	0.03

OBS	MG	MN	HG	NI	K	SE	AG	NA	SR	V	ZN	SB	BI	AG	EL	MO	NI	T	W	ZR	HC03	CO3	OH	SO4
1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	821	.	.	.
2	88	0.17	.	.	1.49	.	.	230	1.77	.	0.03	.	.	.	.	.	.	.	.	.	803	.	.	420

OBS	SCO3	S	TSS	TDS	TAL	HARD	PO4	NH3	NO2	NO3	TOC	DCN	PHE	OGD	BOD	CCD	SIO2	KJEL	TORPH	ALAPH	BETA
1	.	.	.	.	0	.	694	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
2	.	.	.	.	.	1305	679	611	0.09	0.31	.	0.2	.	7	.	.	.	.	26	.	.	7	0

RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM
WATER CHEMISTRY DATA - TRACT C-A
SPRINGS AND SEEPS DATA

---------- REPORT YEAR=1981 TYPE=SEEP STATION=SPG-1 ----------

OBS	DATE	TEMP	PH	SPC COND	WL	ALS	AS	BAE	BB		BR	CD	CA	CL	CR	CU	F	FE	PB	LI
3	16JAN81	7.2	8.0	800	.	.	.	.	.	.		.	.	.	.	.	.	.		.	.	.
4	23APR81	6.8	7.7	850	.	.	.	.	.	.		.	.	.	.	.	.	.		.	.	.
5	26OCT81	7.7	7.2	900	.	.	.	.	.	.	0.19	.	.	79	4.28	.	.	0.26		.	.	.

OBS	MG	MN	HG	NI	K	SE	AG	NA	SR	V	ZN	SB	BI	GA	GE	MOL	ST	NI	WR	ZR	HCO3	CO3	OH	SO4
3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
4	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
5	44	.	.	.	0.49	.	.	49	0.69	.	0.01	.	.	.	.	.	.	.	.	.	439	.	.	123

OBS	SO3	TSS	TDS	TSC	TALK	THARD	PO4	NH3	NO2	NO3	TOC	DOC	CN	PHENOL	BOD	COD	SIO2	KJEL	TORTHO	PALH	BEAT
3	.	.	.	.	.	.	.	.	.	.	.	8	.	.	.	.	.	.	.	.	.
4	.	.	.	.	.	.	.	.	.	.	.	7	.	.	.	.	.	.	.	.	.
5	.	.	.	.	590	379	378	0.07	.	.	0.9	14	.	.	.	.	25	.	.	5	3

RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM
WATER CHEMISTRY DATA - TRACT C-A
SPRINGS AND SEEPS DATA

---------- REPORT YEAR=1981 TYPE=SEEP STATION=SPG-14 ----------

OBS	DATE	TEMP	PH	SPC N/C	WALL	AALS	ABAE	B	BRD	CACL	CRUF	FEB	PBLI
6	30JAN81	7	7.8	1325	.	.	.	.	.	.	.	.	.
7	30APR81	18	8.1	1850	.	.	.	.	.	.	.	.	.
8	27OCT81	6	8.0	2100	.	.	.	0.36	.	110	25.7	.	0.07

OBS	MG	MN	HGI	NK	SEG	SAG	NAR	SV	ZN	SBI	BAE	GLN	MOSTIWR	HCO3	CCO3	OH
6	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
7	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
8	120	0.73	.	2.5	.	240	2.28	.	0.01	.	.	.	.	757	.	.

OBS	SO4	SS3	S	TSC	TSN	TDS	TAL	HARD	APO4	NH3	NO2	NO3	TCC	DC	CNE	PHOS	BGD	COD	SIO2	KEL	ORTHO	ALPHA	BETA
6	.	.	.	.	.	.	.	.	.	.	.	.	.	13	.	.	.	.	.	.	.	.	.	.
7	.	.	.	.	.	.	.	.	.	.	.	.	.	9	.	.	.	.	.	.	.	.	.	.
8	611	.	.	.	.	1626	644	768	0.42	.	.	0.2	.	13	.	.	.	.	.	24	.	.	0	7

RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM
WATER CHEMISTRY DATA - TRACT C-A
SPRINGS AND SEEPS DATA

---------- REPORT YEAR=1981 TYPE=SEEP STATION=SPG-2 ----------

OBS	DATE	TEMP	PH	SPCOND	WALL	AASB	BAE	B	BRD	CDA	CAL	CRU	F	FEB	PB
9	16JAN81	7.7	8.8	925	.	.	.	.	.	.	.	.	.	.	.
10	14APR81	9.4	7.4	1050	.	.	.	.	.	.	.	.	.	.	.
11	26OCT81	8.0	7.7	1075	.	.	.	.	0.22	.	96	8.45	.	0.29	.	.

OBS	LI	MG	MNG	HNI	K	SEG	SAR	NAV	SAR	ZN	SBI	BIA	GAE	GLN	MOS	STI	WR	Z	HCO3	CCO3	OH
9	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
10	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
11	0.01	57	.	.	0.53	.	.	65	0.96	.	0.01	.	.	.	.	.	.	.	452	.	.

OBS	SO4	S3	S	TSS	TSC	TDS	TAL	HARD	PO4	NH3	NO2	NO3	TOC	DOC	N	PHE	BOD	CCD	SI	K	TH	ALP	BAT
9	.	.	.	.	.	.	.	.	.	.	.	.	.	3	.	.	.	.	.	.	.	.	.
10	.	.	.	.	.	.	.	.	.	.	.	.	.	16	.	.	.	.	.	.	.	.	.
11	205	.	.	.	.	697	384	474	0.07	.	.	0.9	.	8	.	.	.	.	23	.	.	0	0

RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM
WATER CHEMISTRY DATA - TRACT C-A
SPRINGS AND SEEPS DATA

---------- REPORT YEAR=1981 TYPE=SEEP STATION=SPG-20 ----------

OBS	DATE	TEMP	PH	SPC COND	WL	AL	AS	AB	BE	B	BR	CD	CA	CL	CR	CU	F	FE	PB
12	23JAN81	7.8	7.5	1175	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
13	13APR81	9.8	7.7	950	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
14	23JUL81	10.0	7.4	1100	.	.	.	.	.	0.3	.	.	144	9.07	.	.	0.21	.	.
15	26OCT81	6.6	7.8	1100	.	0.4	.	.	.	0.3	.	.	85	9.36	.	.	0.26	.	.

OBS	LI	MG	MN	HG	NI	K	SE	AG	NA	SR	V	ZN	SB	BI	AG	EL	MO	NI	TI	WR	ZR	HCO3	CO3	OH	SO4
12	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
13	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
14	.	73	.	.	.	0.58	.	.	89	.	.	.	.	.	.	.	.	.	.	.	.	526	.	.	353
15	0.05	64	.	.	.	0.80	.	.	88	1.31	.	0.01	.	.	.	.	.	.	.	.	.	445	.	.	238

OBS	SO3	TSS	TSCN	TSO4	TDS	ALK	HARD	PO4	NH3	NO2	NO3	TOC	DOC	CN	PHE	HOG	BOD	COD	SI2	KJEL	ORTHOP	ALPHA	BETA
12	.	.	.	.	.	.	.	.	.	.	.	.	17	.	.	.	.	.	.	.	.	.	.
13	.	.	.	.	.	.	.	.	.	.	.	.	6	.	.	.	.	.	.	.	.	.	.
14	.	.	.	.	958	449	660	0.02	0.82	.	1.1	.	7	.	.	.	.	.	22	.	.	.	.
15	.	.	.	.	753	479	475	0.10	.	.	1.3	.	9	.	.	.	.	.	24	.	.	5	1

RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM
WATER CHEMISTRY DATA - TRACT C-A
SPRINGS AND SEEPS DATA

---------- REPORT YEAR=1981 TYPE=SEEP STATION=SPG-3 ----------

OBS	DATE	TEMP	PH	SPC COND	WL	AL	AS	AB	BE	B	FR	CD	CA	CL	CR	CU	F	FE
16	22JAN81	8.0	7.8	975	.	.	.	.	.	.	.	.	.	.	.	.	.	.
17	14APR81	9.7	8.0	990	.	.	.	.	.	.	.	.	.	.	.	.	.	.
18	23JUL81	25.0	8.0	1100	.	.	.	.	.	0.16	.	.	105	11.9	.	.	0.17	.

OBS	PB	LI	MG	MN	HG	NI	K	SE	AG	NA	SR	V	ZN	SB	BI	AG	GE	MOL	SN	TI	W	ZR	HCO3	CO3	CH
16	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
17	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
18	.	.	57	.	.	.	1.71	.	.	125	.	.	.	.	.	.	.	.	.	.	.	.	379	1.21	.

OBS	SO4	SS	TSS	TCN	TDS	TALK	HARD	PO4	NH3	NO2	NO3	TCC	DCN	PHE	BOD	COD	SIO2	SKJEL	ORTHOP	ALPHA	BETA
16	.	.	.	.	.	.	.	.	.	.	.	.	3	.	.	.	.	.	.	.	.
17	.	.	.	.	.	.	.	.	.	.	.	.	8	.	.	.	.	.	.	.	.
18	397	.	4	.	890	351	496	.	0.82	.	.	.	5	.	.	.	15	.	.	.	.

RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM
WATER CHEMISTRY DATA - TRACT C-A
SPRINGS AND SEEPS DATA

---------- REPORT YEAR=1981 TYPE=SEEP STATION=SPG-4 ----------

OBS	DATE	TEMP	PH	SPCOND	WALL	AASAE	BAE	BB	BRD	CACL	CRU	F	FEB
19	22JAN81	8.9	7.7	1175	.	.	.	.	.	.	.	.	.
20	24MAR81	0.5	8.2	900	.	.	.	.	.	.	.	.	.
21	14APR81	9.4	8.1	1000	.	.	.	.	.	.	.	.	.
22	23JUL81	16.0	7.9	1100	.	.	.	0.19	.	140	7.95	0.22	.
23	27OCT81	9.0	8.1	1100	.	.	.	0.13	.	85	8.23	0.35	.

OBS	LI	MG	MN	HG	NI	K	SE	AG	NA	SR	V	ZN	SB	BI	GA	GE	MOL	SN	TI	W	ZR	HCO3	CCO3	OH	SO4
19	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
20	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	391	.	.	.
21	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
22	.	67	.	.	.	1.92	.	.	82	.	.	.	.	.	.	.	.	.	.	.	.	500	.	.	339
23	0.06	63	.	.	.	1.49	.	.	84	1.24	.	.	.	.	.	.	.	.	.	.	.	433	.	.	253

OBS	SO3	S	TSS	TSN	TSO4	TDS	TALK	HARD	PO4	NH3	NO2	NO3	TOC	DOC	CN	PHE	OGD	BCD	SIO2	KJEL	ORTHOP	ALPHA	BETA
19	.	.	.	.	.	.	.	.	.	.	.	.	.	16	.	.	.	.	.	.	.	.	.	.
20	.	.	.	.	0	.	342	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
21	.	.	.	.	.	.	.	.	.	.	.	.	.	7	.	.	.	.	.	.	.	.	.	.
22	.	.	23	.	.	920	428	625	.	1.4	.	1.1	.	3	.	.	.	.	.	18	.	.	.	.
23	.	.	.	.	.	797	374	471	0.1	.	.	1.2	.	7	.	.	.	.	.	23	.	.	0	7

RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM
WATER CHEMISTRY DATA - TRACT C-A
SPRINGS AND SEEPS DATA

---------- REPORT YEAR=1981 TYPE=SEEP STATION=SPG-5 ----------

OBS	DATE	TEMP	PH	SPCOND	WL	AL	AS	AB	BE	B	BR	CD	CA	CL	CR	CU	F	FE	PB
24	23JAN81	5.5	8.0	1200	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
25	30APR81	20.0	8.2	1325	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
26	15OCT81	5.5	7.9	1300	.	.	.	.	.	0.44	.	.	120	43.6	.	.	0.37	.	.

OBS	LI	MG	MN	HG	NI	K	SE	AG	NA	SR	V	ZN	SB	BI	GA	GE	MOL	SN	TI	W	ZR	HC03	CO3	OH
24	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
25	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
26	0.02	72	0.04	.	.	2.2	.	.	110	1.87	.	.	.	.	.	.	.	.	.	.	.	476	.	.

OBS	SO4	SS	S	TSC	TSN	TS	TDS	ALK	HARD	P	NH3	NO2	NO3	TC	TDC	CN	PHE	OGD	BDD	CD	SIL	KJE	TORTHP	ALPA	BET
24	.	.	.	.	.	.	.	.	.	.	.	.	.	.	16	.	.	.	.	.	.	.	.	.	.
25	.	.	.	.	.	.	.	.	.	.	.	.	.	.	6	.	.	.	.	.	.	.	.	.	.
26	389	.	.	.	.	.	923	399	595	0.07	.	.	0.3	.	.	.	.	.	.	.	16	.	.	0	4

RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM
WATER CHEMISTRY DATA - TRACT C-A
SPRINGS AND SEEPS DATA

---------- REPORT YEAR=1981 TYPE=SEEP STATION=SPG-8 ----------

OBS	DATE	TEMP	PH	SPC ND	WALL	AALS	ABAE	B	BR	CD	CA	CL	CRU	F	PBE
27	16JAN81	7.3	8.0	950	.	.	.	.	.	.	.	.	.	.	.
28	24MAR81	8.0	7.3	950	.	.	.	.	.	.	.	.	.	.	.
29	14APR81	7.6	8.9	950	.	.	.	.	.	.	.	.	.	.	.
30	150CT81	7.8	7.7	1050	.	.	.	0.38	.	.	110	15.8	.	0.34	.

OBS	LI	MG	MN	HGI	NK	SEG	AAR	NAR	SV	ZNR	SBI	GAE	GEL	MON	STI	TWR	ZR	HCO3	CO3	OH
27	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
28	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	443	.	.
29	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
30	0.01	56	0.03	.	0.88	.	77	1.13	.	.	.	.	.	.	.	.	.	447	.	.

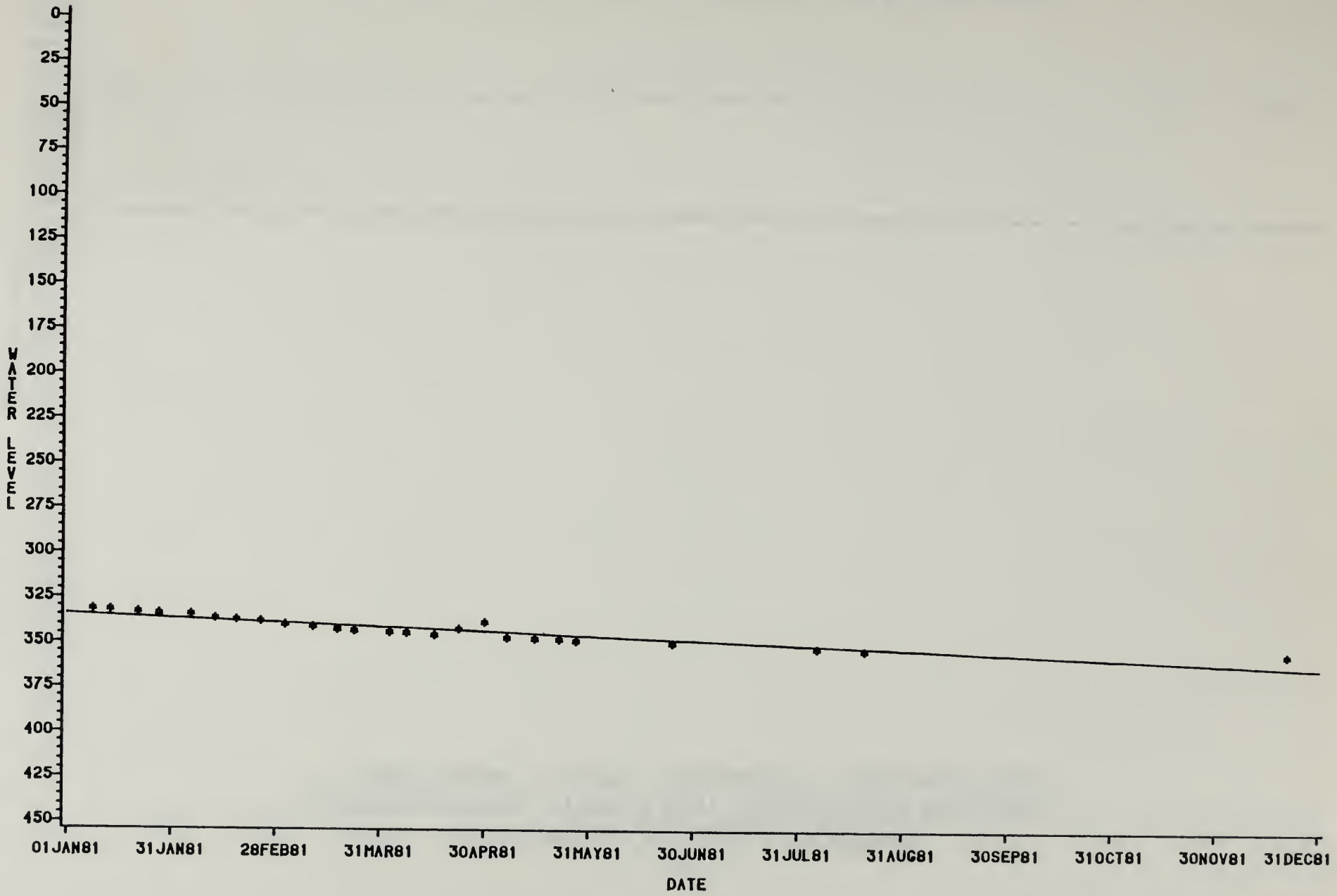
OBS	SO4	SO3	S	TSS	TCN	TSC4	TDS	AALK	HARD	PC4	NH3	NO2	NO3	TOC	DCN	PHE	OGD	BDO	CDO	SI2	KLE	TORPH	ALPA	BET	AOH
27	.	.	.	.	.	.	.	.	.	.	.	.	.	.	5	.	.	.	.	.	.	.	.	.	.
28	.	.	.	.	.	0	.	384	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
29	.	.	.	.	.	.	.	.	.	.	.	.	.	.	6	.	.	.	.	.	.	.	.	.	.
30	270	.	.	.	.	.	754	385	505	0.07	.	.	0.7	.	5	.	.	.	.	.	21	.	.	4	4

APPENDIX 5-1.4

Upper and Lower Aquifer Field Data
Dewatering/Reinjection/Discharge Program

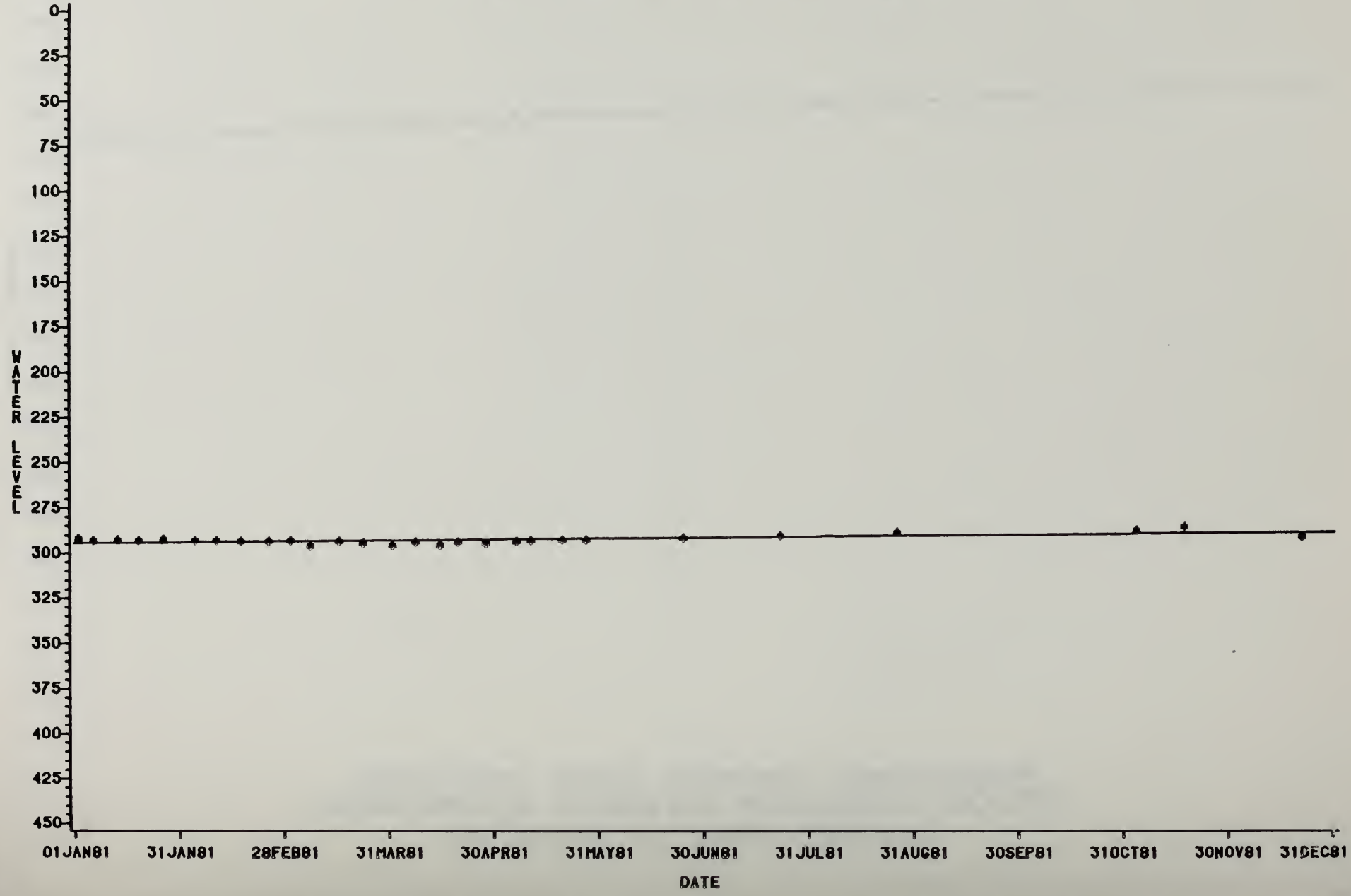
RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM

REPORT YEAR=1981 TYPE=UPPA STATION=GS-9U PARAMETER=WATER LEVEL



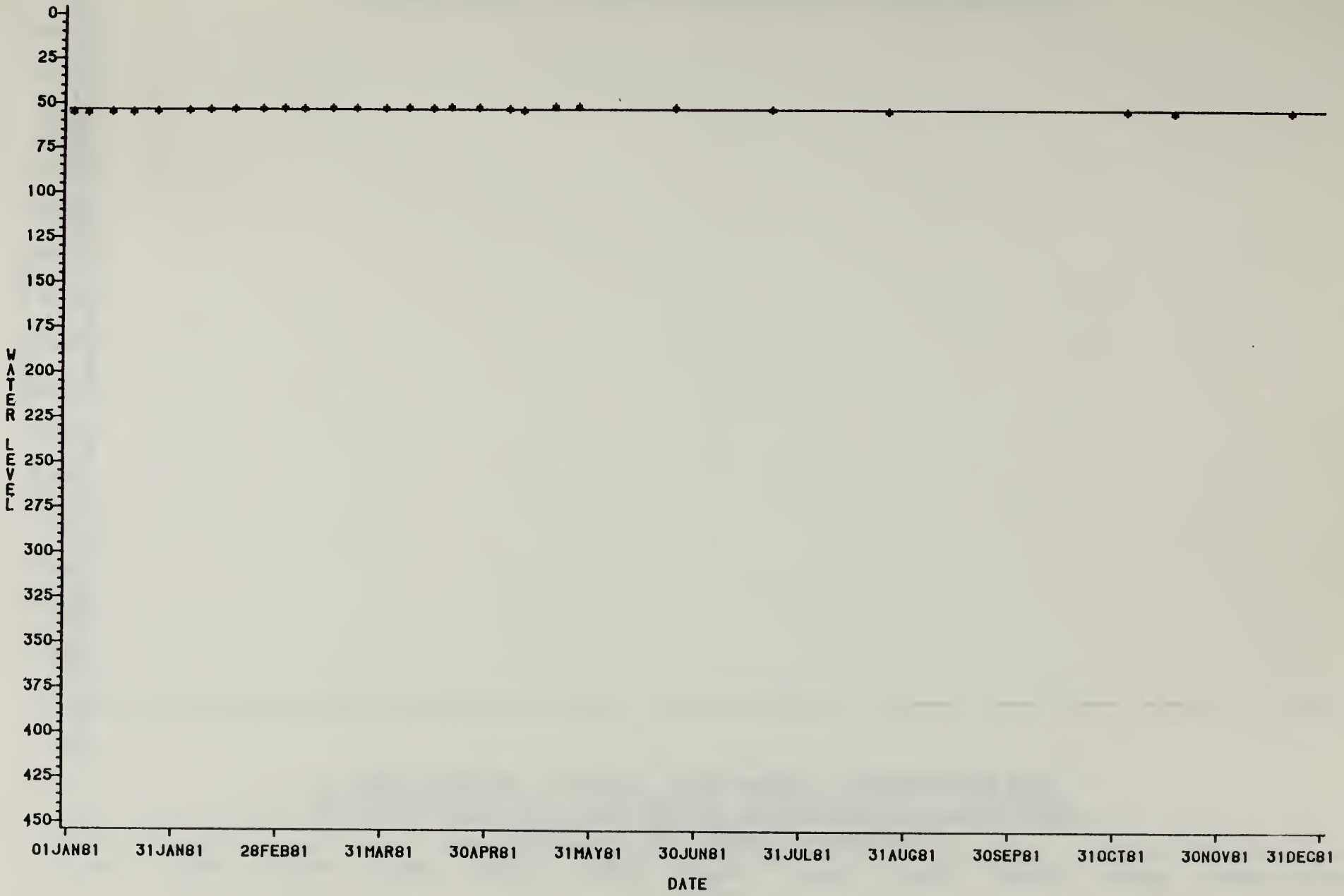
RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM

REPORT YEAR=1981 TYPE=UPPA STATION=CS-M9U PARAMETER=WATER LEVEL



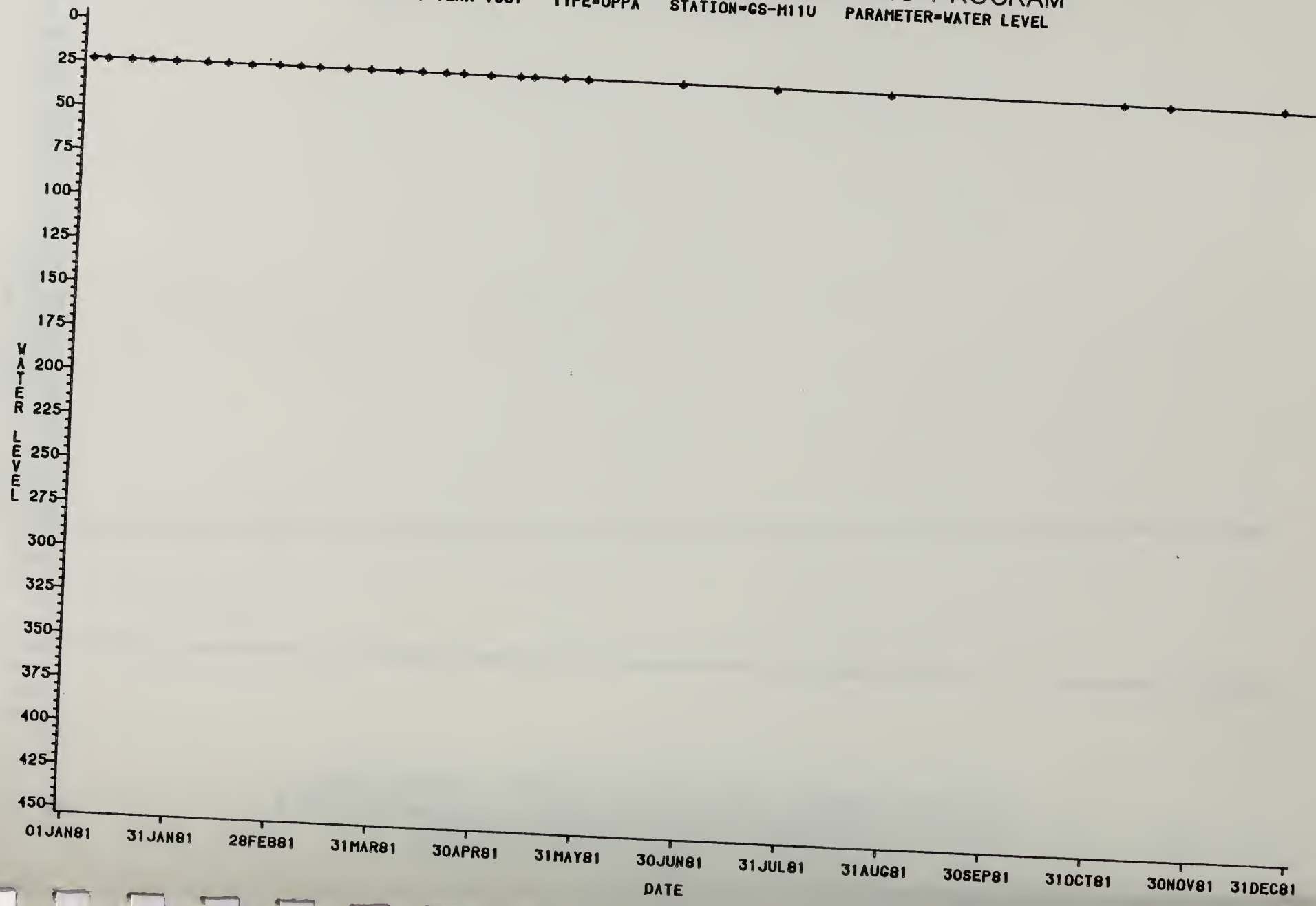
RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM

REPORT YEAR=1981 TYPE=UPPA STATION=GS-M10U PARAMETER=WATER LEVEL



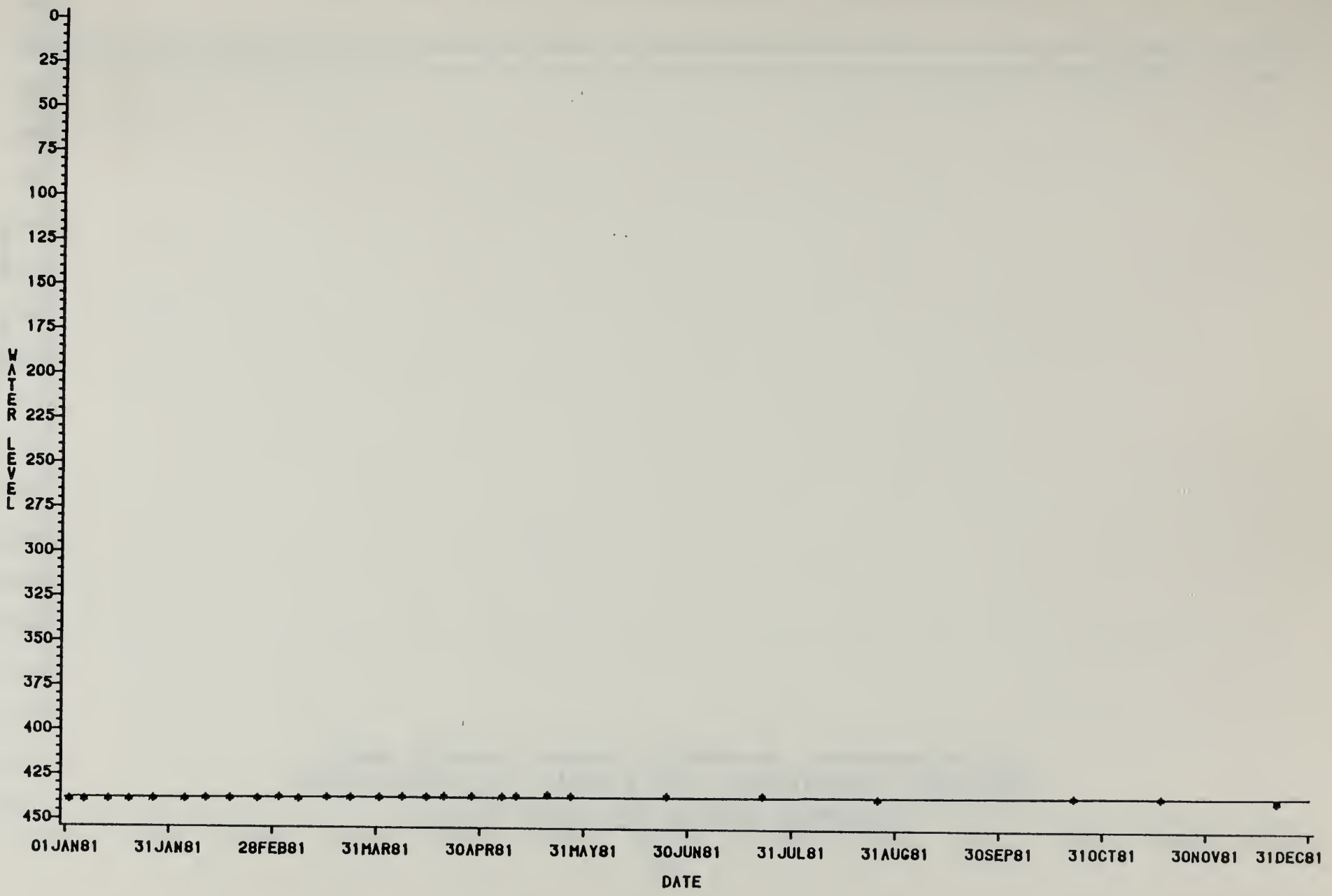
RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM

REPORT YEAR=1981 TYPE=UPPA STATION=GS-M11U PARAMETER=WATER LEVEL



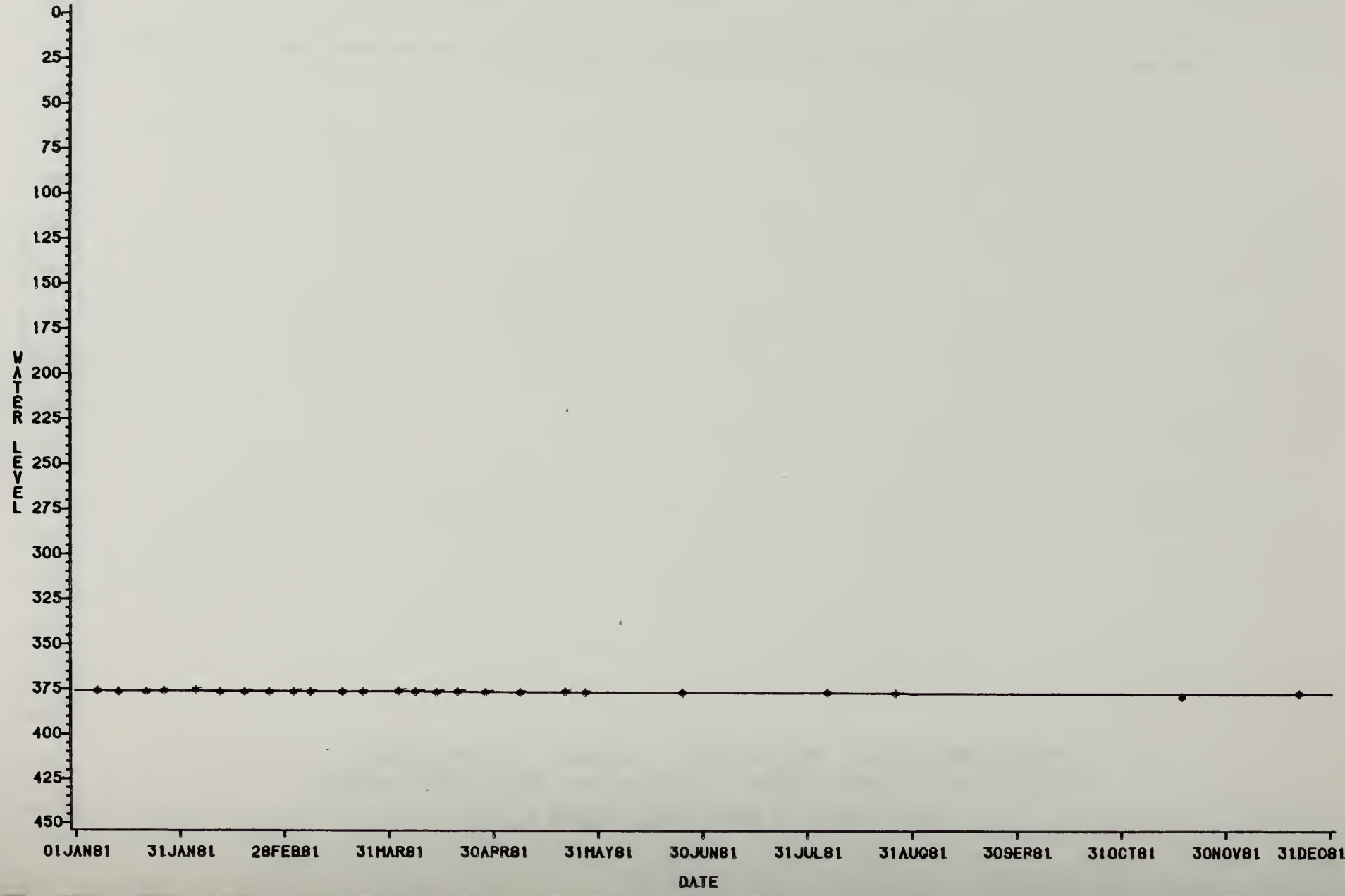
RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM

REPORT YEAR=1981 TYPE=UPPA STATION=GS-M12U PARAMETER=WATER LEVEL



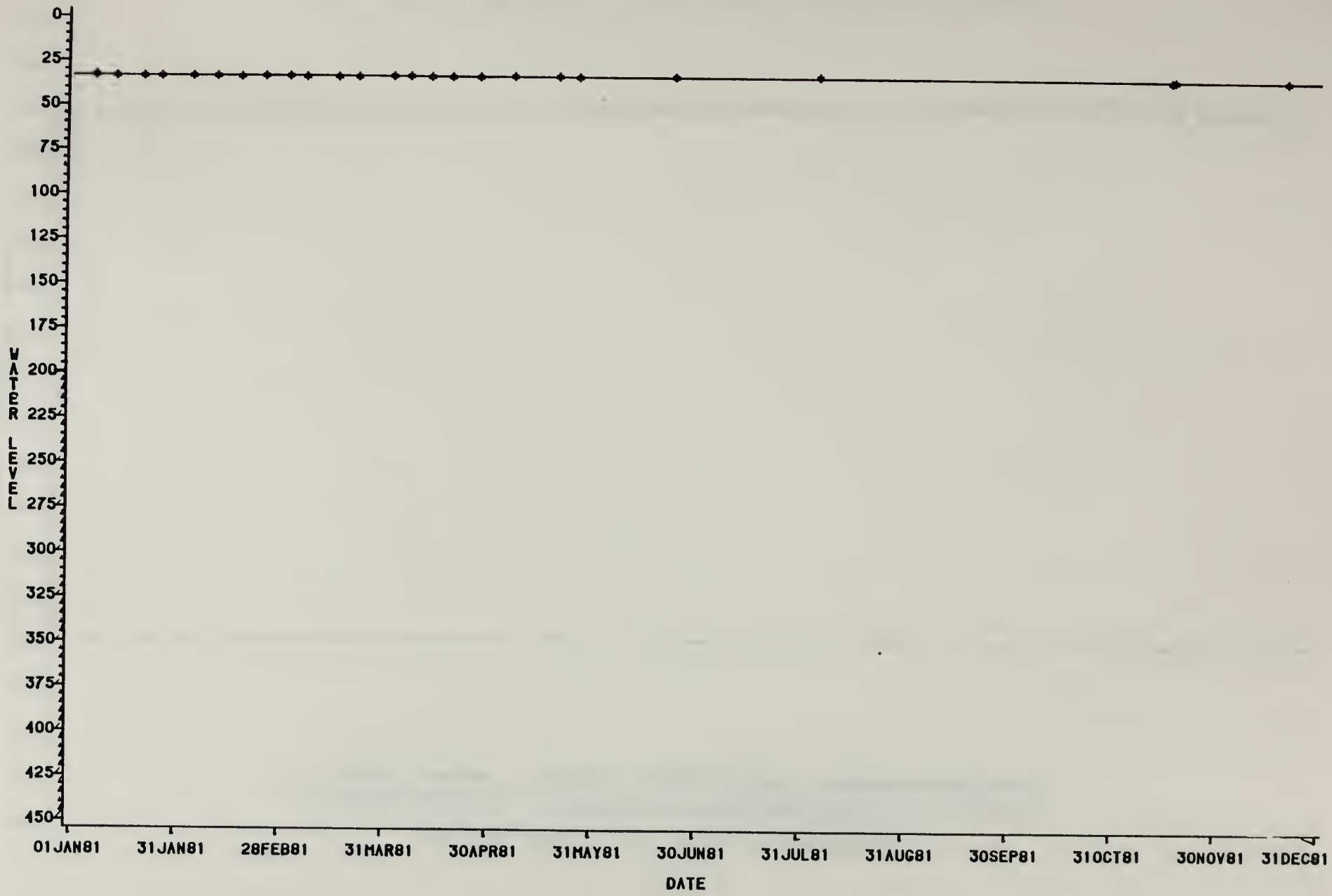
RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM

REPORT YEAR=1981 TYPE=UPPA STATION=AM-2AU PARAMETER=WATER LEVEL



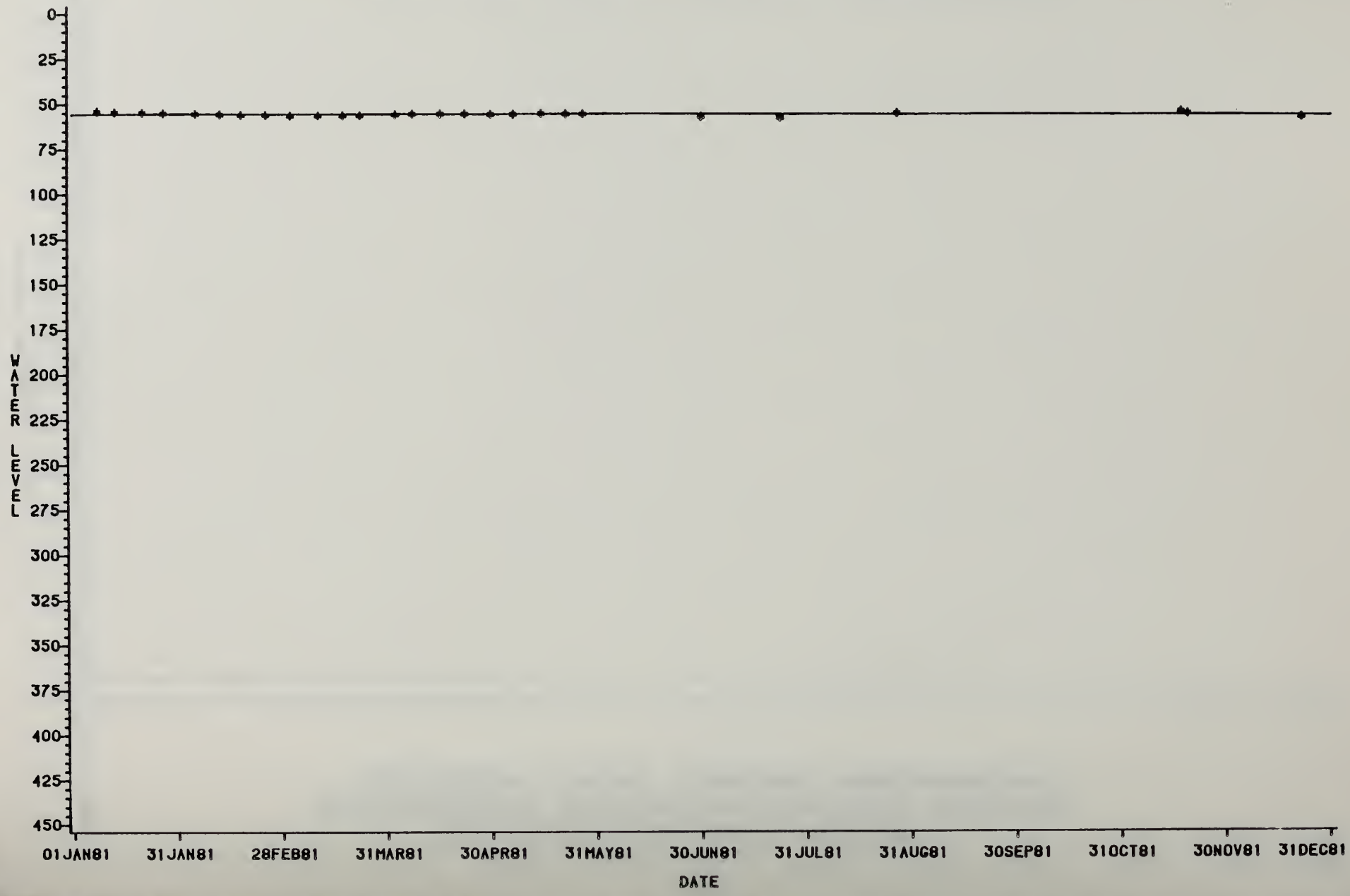
RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM

REPORT YEAR=1981 TYPE=UPPA STATION=AM-3U PARAMETER=WATER LEVEL



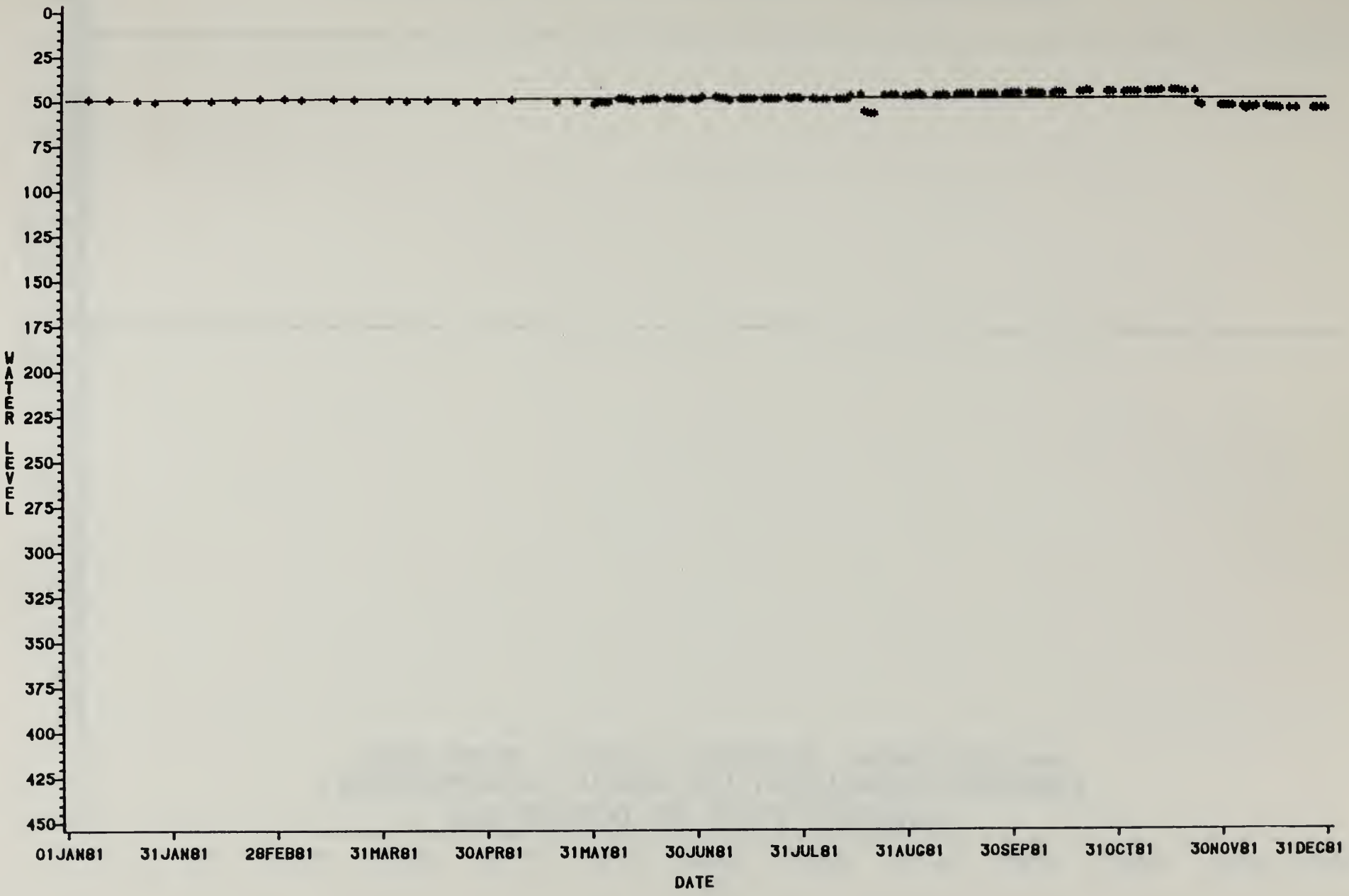
RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM

REPORT YEAR=1981 TYPE=UPPA STATION=CE-708U PARAMETER=WATER LEVEL



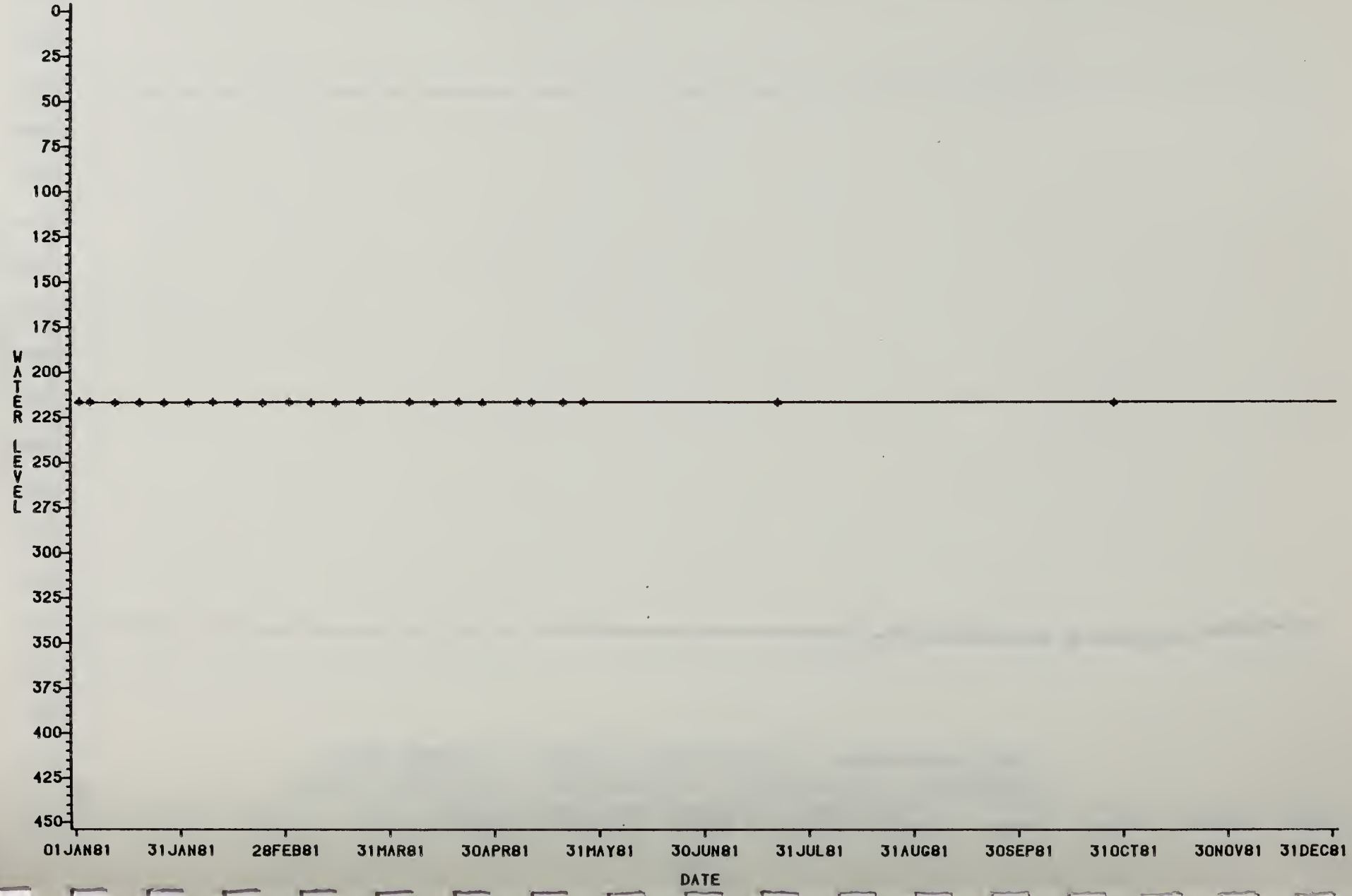
RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM

REPORT YEAR=1981 TYPE=UPPA STATION=CE-702U PARAMETER=WATER LEVEL



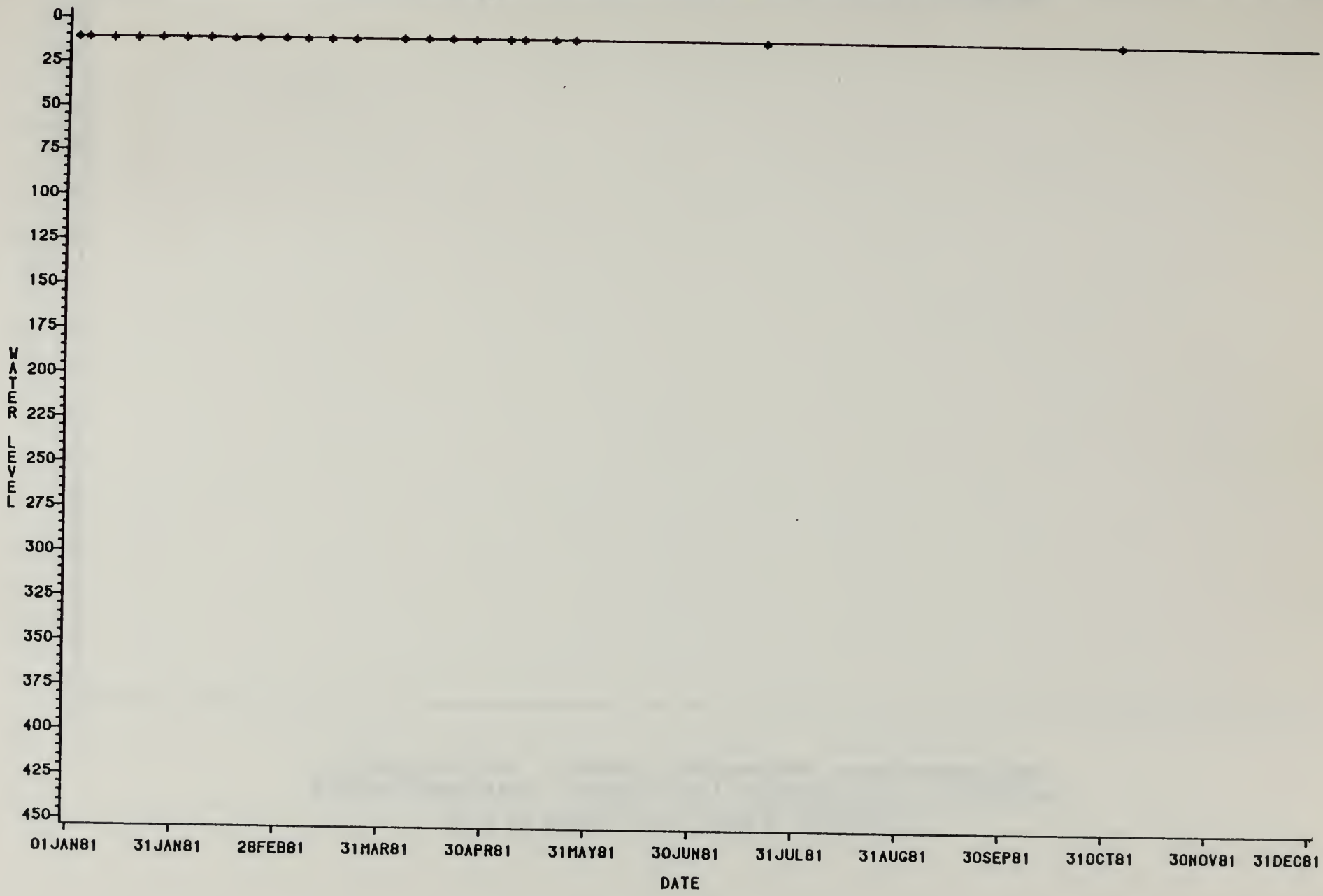
RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM

REPORT YEAR=1981 TYPE=UPPA STATION=GS-M2U PARAMETER=WATER LEVEL

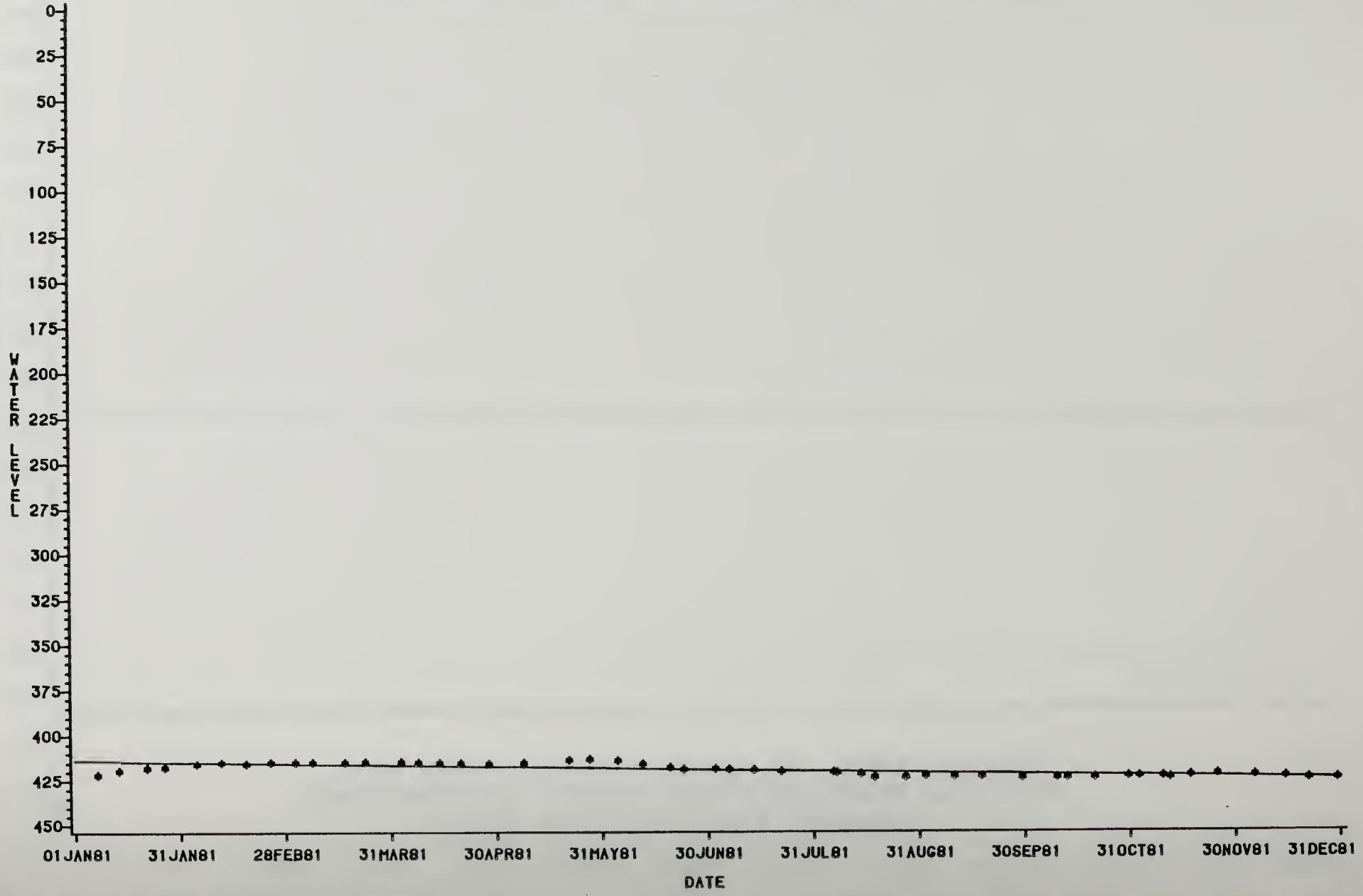


RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM

REPORT YEAR=1981 TYPE=UPPA STATION=GS-M3U PARAMETER=WATER LEVEL

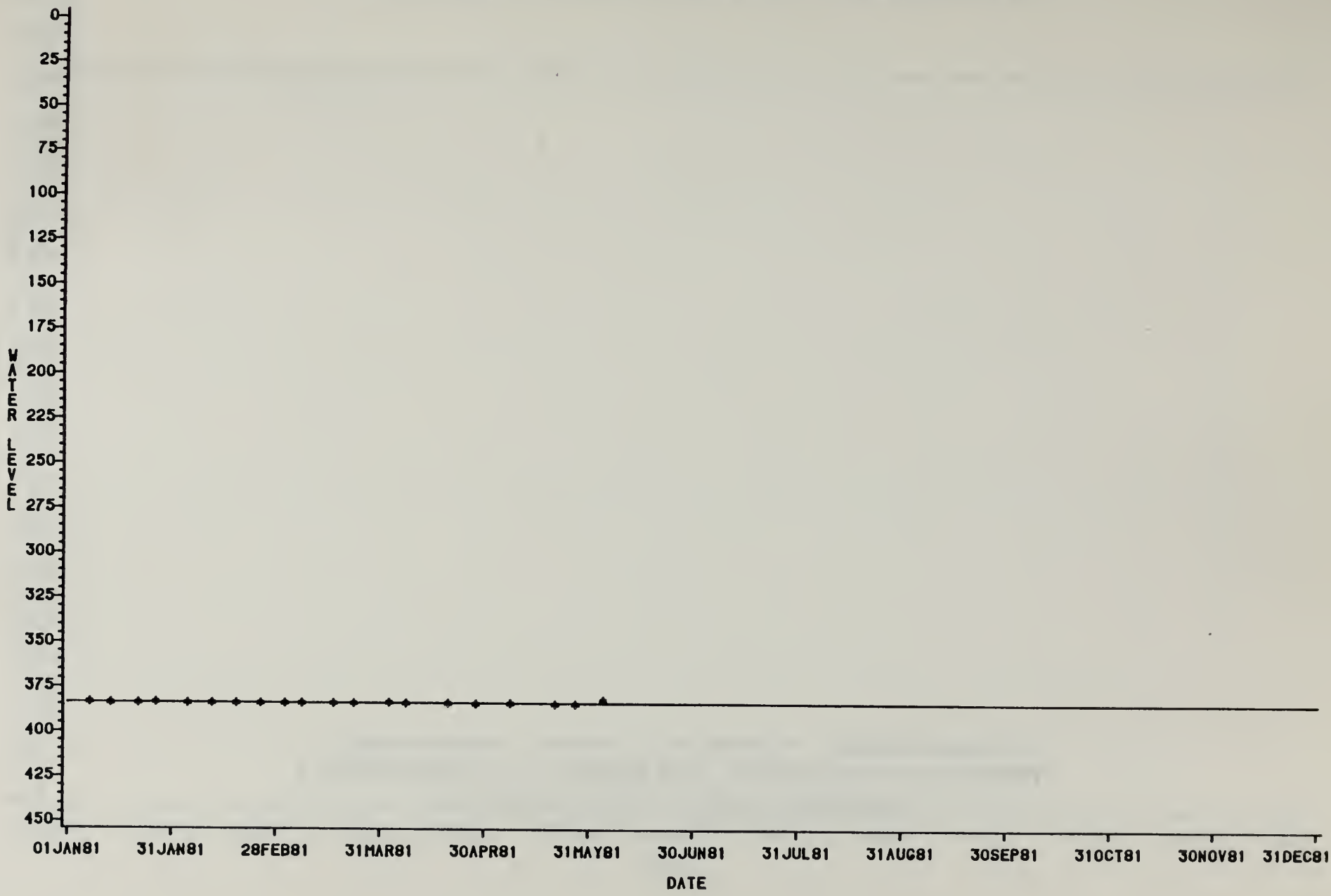


RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM
REPORT YEAR=1981 TYPE=UPPA STATION=GS-10U PARAMETER=WATER LEVEL



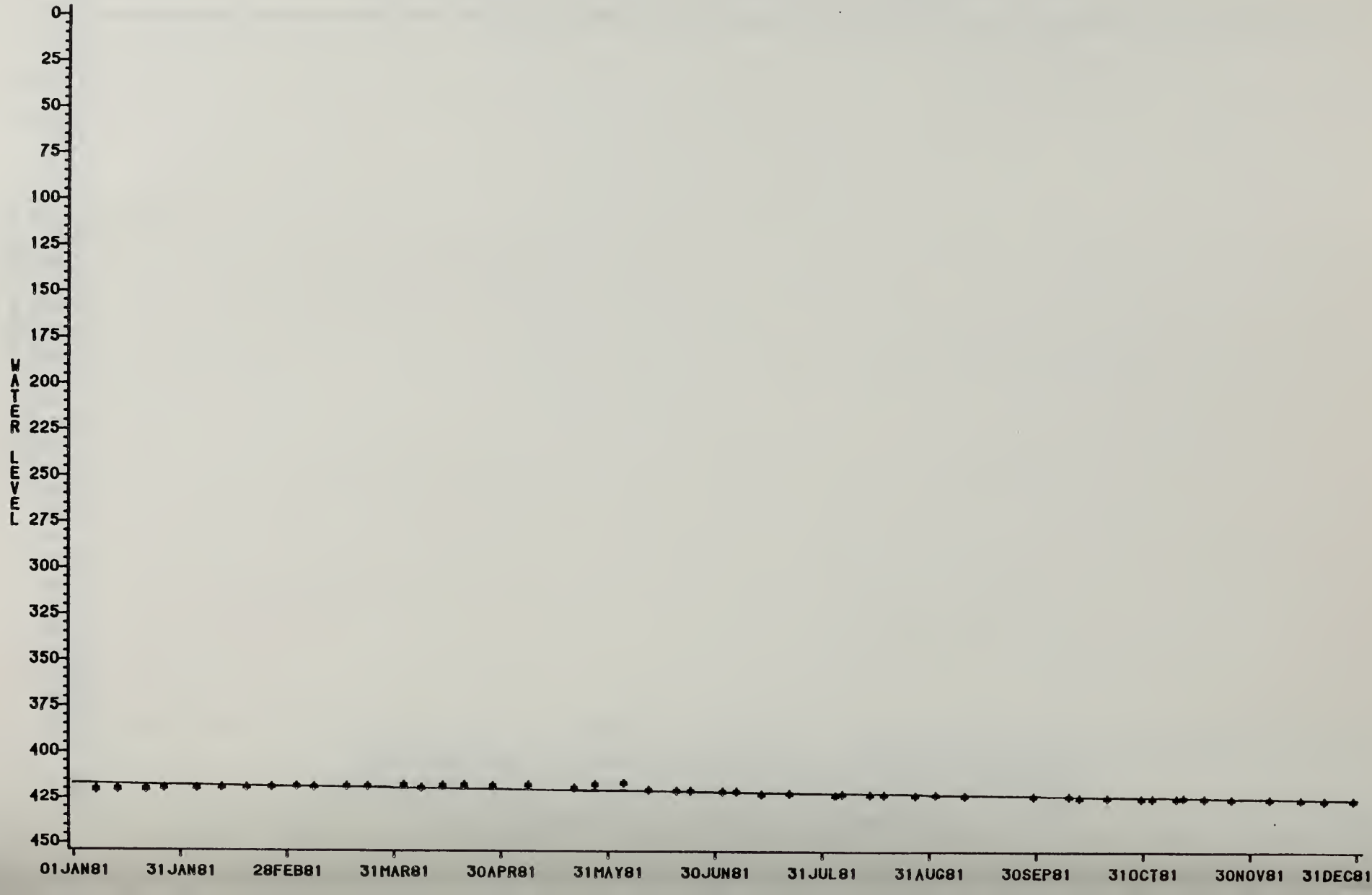
RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM

REPORT YEAR=1981 TYPE=UPPA STATION=GS-12U PARAMETER=WATER LEVEL



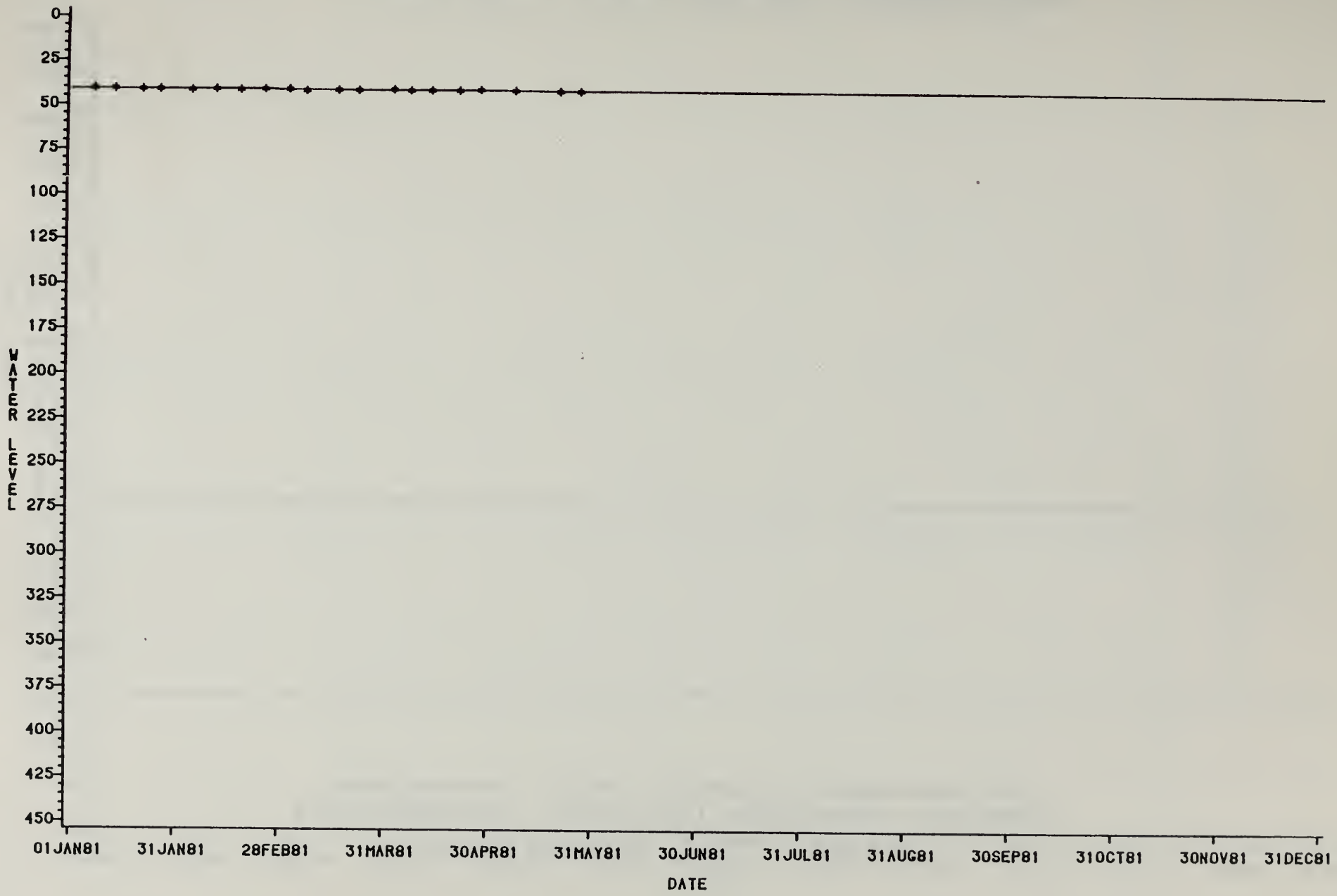
RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM

REPORT YEAR=1981 TYPE=UPPA STATION=GS-13U PARAMETER=WATER LEVEL



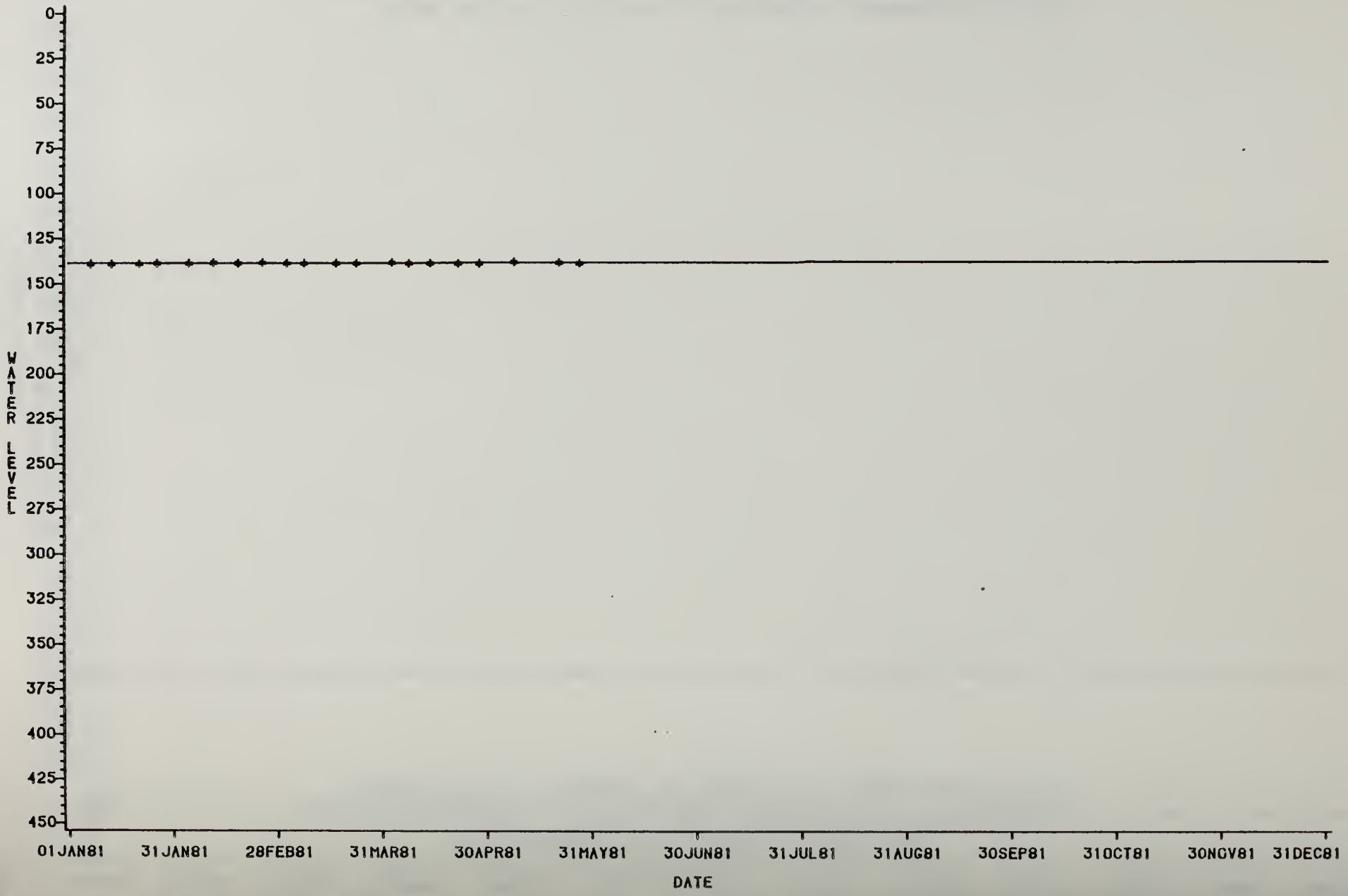
RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM

REPORT YEAR=1981 TYPE=LOWA STATION=CE-702L PARAMETER=WATER LEVEL



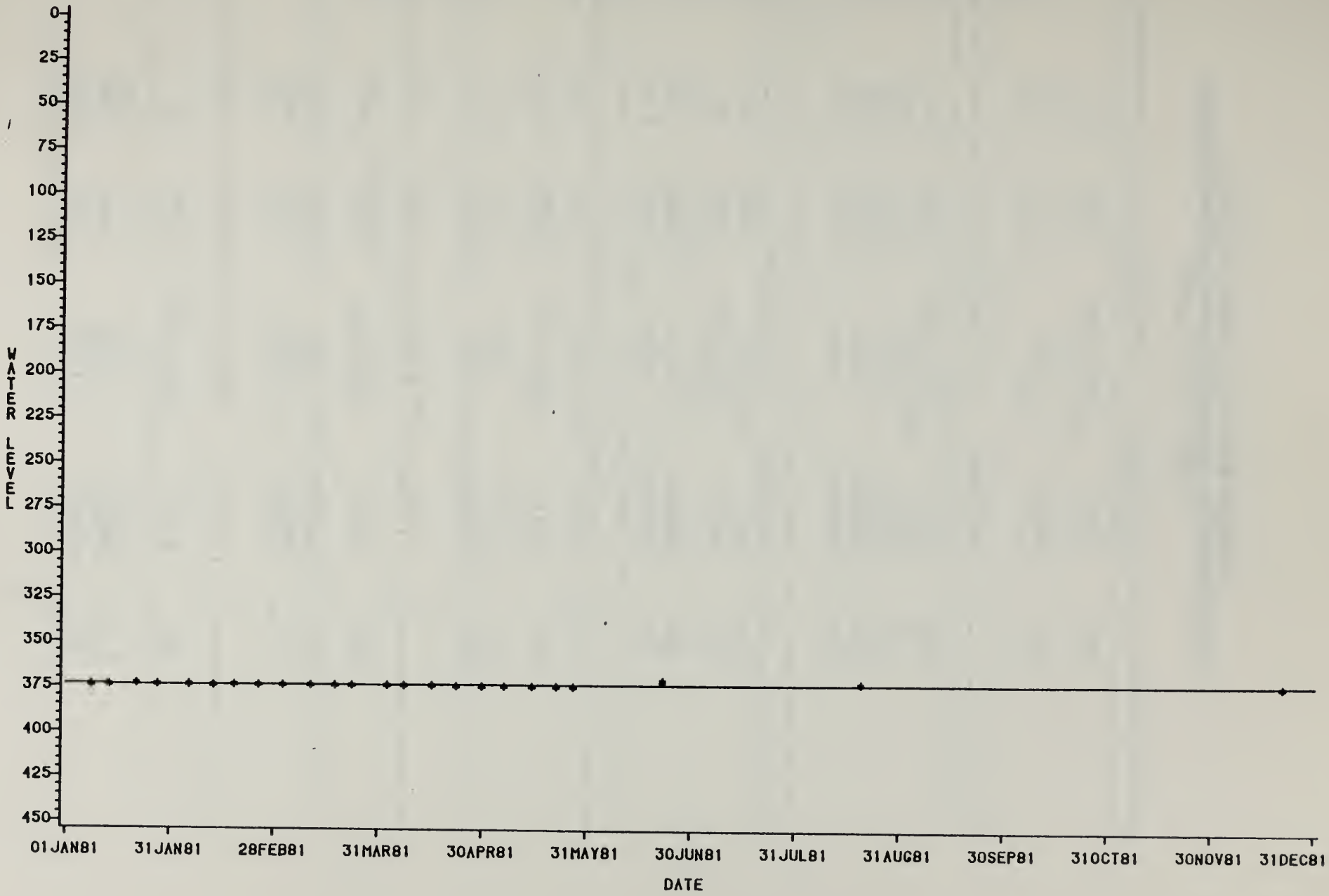
RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM

REPORT YEAR=1981 TYPE=LOWA STATION=GS-19L PARAMETER=WATER LEVEL



RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM

REPORT YEAR=1981 TYPE=LOWA STATION=GS-17L PARAMETER=WATER LEVEL



RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM
FIELD DATA - 1981

---------- TYPE=UPPA STATION=AM-3U ----------

OBS	DATE	SPC_COND	TEMP	PH
196	18NOV81	1100	11.5	8.3

---------- TYPE=UPPA STATION=CE-701U ----------

OBS	DATE	SPC_COND	TEMP	PH
197	30JUN81	1300	13.0	8.0
198	23JUL81	1500	13.3	7.2
199	18NOV81	1400	12.3	7.7

---------- TYPE=UPPA STATION=CE-702U ----------

OBS	DATE	SPC_COND	TEMP	PH
200	30JUN81	1300	15.6	7.6
201	17NOV81	1400	15.4	8.2

---------- TYPE=UPPA STATION=GS-D1U ----------

OBS	DATE	SPC_COND	TEMP	PH
214	06AUG81	1225	15.9	8.3
215	23DEC81	1350	15.0	8.4

---------- TYPE=UPPA STATION=GS-D3U ----------

OBS	DATE	SPC_COND	TEMP	PH
216	05AUG81	1250	16.0	8.3
217	09NOV81	1300	15.3	8.7

---------- TYPE=UPPA STATION=GS-MDP2CU ----------

OBS	DATE	SPC_COND	TEMP	PH
218	29JUN81	1250	17.3	8.5
219	09NOV81	1600	16.2	8.3
220	22DEC81	1625	16.0	8.2

RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM
FIELD DATA - 1981

---------- TYPE=UPPA STATION=GS-M2U ----------

OBS	DATE	SPC_COND	TEMP	PH
226	27OCT81	1575	11.7	9.4

---------- TYPE=UPPA STATION=GS-M3U ----------

OBS	DATE	SPC_COND	TEMP	PH
227	03NOV81	1300	8.8	9.7

---------- TYPE=UPPA STATION=GS-M4U ----------

OBS	DATE	SPC_COND	TEMP	PH
228	25JUN81	1900	15.3	7.7
229	27OCT81	1900	14.5	7.5

---------- TYPE=UPPA STATION=GS-M9U ----------

OBS	DATE	SPC_COND	TEMP	PH
235	03NOV81	3000	12.2	7

---------- TYPE=UPPA STATION=GS-M10U ----------

OBS	DATE	SPC_COND	TEMP	PH
223	03NOV81	1350	9.2	7.6

---------- TYPE=UPPA STATION=GS-M11U ----------

OBS	DATE	SPC_COND	TEMP	PH
224	03NOV81	1350	8.4	7.8

---------- TYPE=UPPA STATION=GS-M12U ----------

OBS	DATE	SPC_COND	TEMP	PH
225	22OCT81	1425	13.1	7.2

RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM
FIELD DATA - 1981

---------- TYPE=UPPA STATION=CE-708U ----------

OBS	DATE	SPC_COND	TEMP	PH
209	19NOV81	1250	11.8	7.7

---------- TYPE=UPPA STATION=GS-10U ----------

OBS	DATE	SPC_COND	TEMP	PH
238	11NOV81	2050	13.3	7.4

---------- TYPE=UPPA STATION=GS-13U ----------

OBS	DATE	SPC_COND	TEMP	PH
239	11NOV81	1650	12.6	7.4

APPENDIX 5-1.5

Upper Aquifer Water Quality Data
Dewatering/Reinjection/Discharge
Program

RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM
WATER CHEMISTRY DATA - TRACT C-A
UPPER AQUIFER WATER QUALITY DATA
DEWATERING/REINJECTION/DISCHARGE PROGRAM

---------- REPORT YEAR=1981 TYPE=LOWA STATION=GS-17L ----------

OBS	DATE	TEMP	PH	SPEC COND	WALL	AALS	ABAE	B	BRD	CDA	CL	CRU	F	FE	PB
1	25MAR81	7.6	8.7	1450	.	.	.	.	.	.	.	.	.	.	.
2	30APR81	16.8	8.6	1620	.	.	.	.	0.48	.	4.6	29.7	.	1.38	0.07	.

OBS	LI	MG	MN	HG	NI	K	SE	AG	NA	SR	V	ZN	SB	MOLI	SA	TE	GE	GL	MN	SI	WR	HCO3	CO3	OH
1	0.11	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	743	7.06	.
2	0.11	31	0.01	0.9	.	2.05	.	.	350	0.15	.	.	.	.	.	.	.	.	.	.	.	760	6.64	.

OBS	SO4	SS	TSS	TSN	TSO4	TDS	TALK	HARD	APO4	NH3	NO2	NO3	TCN	TDCN	PHENOL	OG	BD	CD	SI	KJEL	ORTHO	ALPHA	BETA
1	.	.	.	.	0	.	758	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
2	255	.	.	.	.	1144	758	139	.	0.55	0.081	0.1	.	6	.	0	.	.	15	.	.	.	0	3

RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM
WATER CHEMISTRY DATA - TRACT C-A
UPPER AQUIFER WATER QUALITY DATA
DEWATERING/REINJECTION/DISCHARGE PROGRAM

---------- REPORT YEAR=1981 TYPE=LOWA STATION=GS-19L ----------

OBS	DATE	TEMP	PH	SPC COND	WL	ALS	ABS	ABE	B	BR	CD	CA	CL	CRU	F	FEB
3	25MAR81	3.5	8.0	1650	.	.	.	.	.	.	.	.	.	.	.	.
4	30APR81	15.1	7.7	1900	.	.	.	.	0.19	.	.	6.6	6.72	.	4.66	.

OBS	LI	MG	MNG	HI	NK	SEG	ALK	SR	V	NZ	SBI	AEL	MONIT	ZWR	HCO3	CO3
3	0.05	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
4	0.03	7.4	.	.	1.32	.	550	0.15	.	9.1	.	.	.	.	1427	.

OBS	CO	SH	SO4	SO3	TSS	TSC	TSN	TSO4	TDS	ALK	HARD	PO4	NH3	NO2	NO3	TOC	DCN	PHE	BOD	COD	SIO2	KJEL	ORPHP	ALPHA	BETA
3	.	.	.	.	.	.	.	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
4	.	76.5	.	.	.	.	.	.	1404	1214	46	.	0.2	.	.	.	2	.	0	.	.	14	7	.	.	0	0

RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM
WATER CHEMISTRY DATA - TRACT C-A
UPPER AQUIFER WATER QUALITY DATA
DEWATERING/REINJECTION/DISCHARGE PROGRAM

---------- REPORT YEAR=1981 TYPE=UPPA STATION=AM-3U ----------

OBS	DATE	TEMP	PH	SPC COND	WL	ALS	ABE	BB	BR	CDA	CL	CRU	F	FE	PB	LI
5	29JAN81	11.1	8.1	1150	.	.	.	0.16	.	38	7.78	.	0.26	.	.	.
6	24FEB81	11.4	8.2	1150	.	.	.	1.17	.	35	8.91	.	0.28	0.05	.	.
7	31MAR81	10.5	8.1	1150	.	.	.	.	.	33	8.96	.	0.41	.	.	.
8	14APR81	11.0	8.3	1110	.	.	.	0.03	.	34	8.40	.	0.43	.	.	.
9	11NOV81	11.5	8.3	1100	.	.	.	0.32	.	39	9.25	.	0.94	.	.	0.09

OBS	MG	MN	HG	NI	K	SE	SAG	NA	SR	V	ZN	SB	BI	GA	GE	MOL	NS	TI	W	ZR	HCO3	CO3	CH
5	45	.	.	.	0.54	.	.	170	.	.	.	.	.	.	.	.	.	.	.	.	447	.	.
6	44	.	.	.	0.54	.	.	170	.	.	.	.	.	.	.	.	.	.	.	.	425	1.42	0.5
7	48	.	.	.	0.54	.	.	180	.	.	.	.	.	.	.	.	.	.	.	.	445	.	.
8	47	.	.	.	0.67	.	.	180	.	.	.	.	.	.	.	.	.	.	.	.	452	.	.
9	44	0.04	.	.	0.45	.	.	160	3.04	.	0.03	.	.	.	.	.	.	.	.	.	452	.	.

OBS	SO4	SO3	S	TSS	TSCN	TSO4	TDS	ALK	HARD	PO4	NH3	NO2	NO3	TOC	DOC	CNE	PHE	OGD	BOD	CCO2	SI	KJEL	ORTHOP	ALPHA	BETA
5	276	.	.	.	.	.	764	406	280	0.21	.	6.000	.	.	4	.	.	.	.	.	13	.	.	.	.
6	261	.	.	.	.	.	804	395	268	0.03	0.20	3.000	0.1	.	6	.	.	.	.	.	17	.	.	.	.
7	320	.	.	.	.	.	816	394	279	0.05	0.10	0.003	.	.	.	.	.	.	.	.	17	.	.	.	.
8	247	.	.	.	.	.	804	384	278	0.02	0.12	.	.	.	3	.	.	.	.	.	15	.	.	.	.
9	244	.	.	.	.	.	754	384	278	0.08	0.66	.	0.1	.	6	.	.	.	.	.	18	.	.	1	0

RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM
WATER CHEMISTRY DATA - TRACT C-A
UPPER AQUIFER WATER QUALITY DATA
DEWATERING/REINJECTION/DISCHARGE PROGRAM

---------- REPORT YEAR=1981 TYPE=UPPA STATION=CE-701U ----------

OBS	DATE	TEMP	PH	SPC COND	WL	AL	AS	BA	BE	B	BR	CD	CA	CL
10	30JAN81	11.4	7.4	1375	.	0.1	0.01	0.1	0.01	0.20	0.2	0.01	77	8.45
11	25FEB81	12.2	8.3	1230	.	.	.	.	.	0.36	.	.	38	10.40
12	26MAR81	12.7	8.5	2150	.	.	.	.	.	0.17	.	.	24	10.60
13	14APR81	12.7	8.3	1220	.	.	.	.	.	0.01	.	.	39	11.20
14	23JUL81	13.3	7.2	1500	.	.	.	.	.	0.17	.	.	110	9.63
15	18NOV81	12.3	7.7	1400	.	.	.	.	.	.	.	.	72	9.38

OBS	CR	CU	F	FE	PB	LI	MG	MN	HG	NI	K	SE	AG	NA	SR
10	0.01	0.01	0.17	1.31	0.1	0.08	66	0.26	0.3	0.05	0.95	0.01	.	200	1.28
11	.	.	0.16	0.05	.	.	50	.	.	.	1.25	.	.	190	.
12	.	.	0.13	.	.	.	43	.	.	.	1.33	.	.	190	.
13	.	.	0.11	.	.	.	49	.	.	.	1.17	.	.	190	.
14	.	.	0.43	.	.	.	68	.	.	.	1.30	.	.	150	.
15	.	.	0.56	.	.	0.06	62	0.18	.	.	0.83	.	.	180	1.20

RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM
WATER CHEMISTRY DATA - TRACT C-A
UPPER AQUIFER WATER QUALITY DATA
DEWATERING/REINJECTION/DISCHARGE PROGRAM

---------- REPORT YEAR=1981 TYPE=UPPA STATION=CE-701U ----------

OBS	V	ZN	SB	BI	GA	GE	MOL	SN	TI	W	ZR	HCO3	CO3	OH	SO4	SO3	S	TSS	TCN
10	0.5	0.02	.	0.01	0.5	0.1	0.1	.	0.5	.	10	469	1.00	0.5	530	.	0.1	.	.
11	.	.	.	.	.	.	.	.	.	.	.	335	1.00	0.5	414	.	.	.	.
12	.	.	.	.	.	.	.	.	.	.	.	266	1.44	.	422	.	.	.	.
13	.	.	.	.	.	.	.	.	.	.	.	329	.	.	381	.	.	.	.
14	.	.	.	.	.	.	.	.	.	.	.	477	.	.	512	.	.	15	.
15	.	0.07	.	.	.	.	.	.	.	.	.	488	.	.	400	.	.	.	.

OBS	TSO4	TDS	ALK	HARD	PO4	NH3	NO2	NO3	TOC	DOC	CN	PHE	O2G	BOD	COD	SIO2	KJEL	ORTHOP	ALPHA	BETA
10	.	1156	406	464	0.02	0.60	1	0.1	.	5	0.05	0.1	.	.	64	17	.	.	9	13
11	.	896	294	301	0.01	0.20	3	0.1	.	9	.	.	.	.	.	7	.	.	.	.
12	.	832	259	236	.	2.60	.	.	.	3	.	.	.	.	.	5	.	.	.	.
13	.	852	289	299	.	0.15	.	.	.	3	.	.	.	.	.	9	.	.	.	.
14	.	1150	411	554	.	0.11	.	.	.	3	.	.	.	.	.	19	.	.	.	.
15	.	965	409	434	0.04	0.34	.	.	.	4	.	.	.	.	.	22	.	.	9	1

RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM
WATER CHEMISTRY DATA - TRACT C-A
UPPER AQUIFER WATER QUALITY DATA
DEWATERING/REINJECTION/DISCHARGE PROGRAM

---------- REPORT YEAR=1981 TYPE=UPPA STATION=CE-702U ----------

OBS	DATE	TEMP	PH	SPEC COND	WL	ALL	AS	BA	BE	B	BR	CD	CA	CL
16	30JAN81	14.0	8.0	1325	.	0.1	0.01	0.1	0.01	0.20	0.2	0.01	37	13.30
17	24FEB81	14.8	8.3	1350	.	.	.	.	.	0.42	.	.	27	12.90
18	26MAR81	14.8	8.5	1375	.	.	.	.	.	0.08	.	.	19	16.20
19	30APR81	14.8	7.6	1480	.	.	.	.	.	0.10	.	.	28	9.52
20	17NOV81	15.4	8.2	1400	.	.	.	.	.	.	.	.	33	9.38

OBS	CR	CU	F	FE	PB	LI	MG	MN	HG	NI	K	SE	AG	NA	SR
16	0.01	0.01	0.52	0.16	0.1	0.13	71	0.04	0.3	0.05	0.40	0.01	.	240	5.40
17	.	.	0.57	0.05	.	.	65	.	.	.	0.60	.	.	230	.
18	.	.	0.72	.	.	.	57	.	.	.	0.97	.	.	240	.
19	.	.	0.53	5.20	.	.	72	.	.	.	0.49	.	.	220	.
20	.	.	1.66	.	.	0.11	73	0.01	.	.	0.42	.	.	210	4.92

RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM
WATER CHEMISTRY DATA - TRACT C-A
UPPER AQUIFER WATER QUALITY DATA
DEWATERING/REINJECTION/DISCHARGE PROGRAM

---------- REPORT YEAR=1981 TYPE=UPPA STATION=CE-702U ----------

OBS	V	ZN	SB	BI	GA	GE	MOL	SN	TI	WR	HCO3	CO3	OH	SO4	SO3	S	TSS	TCN	TSO4
16	0.5	0.01	.	0.01	0.5	0.1	0.1	.	0.5	.	10	534	1.00	0.5	416	.	0.1	.	.	.
17	.	.	.	.	.	.	.	.	.	.	.	507	1.78	0.5	391	.	.	.	.	.
18	.	.	.	.	.	.	.	.	.	.	.	561	1.20	.	325	.	.	.	.	.
19	.	.	.	.	.	.	.	.	.	.	.	557	.	.	411	.	.	.	.	.
20	.	0.03	.	.	.	.	.	.	.	.	.	567	.	.	348	.	.	.	.	.

OBS	TDS	AL K	HARD	PO4	NH3	NO2	NO3	TOC	DOC	CN	PHE	OG	BOD	COD	SIO2	KJEL	ORTHO PHA	ALP HA	BETA
16	1176	461	385	0.02	1.20	1.000	0.1	.	9	0.05	0.1	.	.	24	23	.	.	18	9
17	1016	472	335	0.31	0.40	13.000	0.1	.	7	.	.	.	.	.	20	.	.	.	.
18	1008	499	282	.	1.00	.	.	.	7	.	.	.	.	.	12	.	.	.	.
19	988	476	366	.	0.09	0.019	0.0	.	1	.	.	.	.	.	20	.	.	.	.
20	963	472	382	0.05	0.39	.	.	.	4	.	.	.	.	.	23	.	.	3	0

RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM
WATER CHEMISTRY DATA - TRACT C-A
UPPER AQUIFER WATER QUALITY DATA
DEWATERING/REINJECTION/DISCHARGE PROGRAM

---------- REPORT YEAR=1981 TYPE=UPPA STATION=CE-707U ----------

OBS	DATE	TEMP	PH	SPC COND	WL	AL	AS	BA	BE	B	BR	CD	CA	CL
21	30JAN81	10.4	7.8	1175	.	0.1	0.01	0.1	0.01	0.24	0.2	0.01	63	10.3
22	25FEB81	10.9	7.8	1210	.	.	.	.	.	0.21	.	.	50	11.2
23	26MAR81	11.5	7.7	1150	.	.	.	.	.	2.24	.	.	44	11.2
24	14APR81	11.6	7.9	1100	.	.	.	.	.	0.02	.	.	44	11.8
25	23JUL81	11.6	7.7	1150	.	.	.	.	.	0.21	.	.	90	12.8
26	19NOV81	11.2	7.7	1500	.	.	.	.	.	0.06	.	.	88	20.2

OBS	CR	CU	F	FE	PB	LI	MG	MN	HG	NI	K	SE	AG	NA
21	0.01	0.01	0.18	0.05	0.1	0.07	70	0.20	0.3	0.05	0.79	0.01	.	140
22	.	.	0.19	1.21	.	.	66	.	.	.	0.80	.	.	130
23	.	.	0.08	0.05	.	.	66	.	.	.	0.82	.	.	130
24	.	.	0.05	.	.	.	65	.	.	.	0.79	.	.	140
25	.	.	0.14	.	.	.	67	.	.	.	0.51	.	.	126
26	.	.	0.23	.	.	0.05	92	0.64	.	.	1.05	.	.	130

RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM
WATER CHEMISTRY DATA - TRACT C-A
UPPER AQUIFER WATER QUALITY DATA
DEWATERING/REINJECTION/DISCHARGE PROGRAM

---------- REPORT YEAR=1981 TYPE=UPPA STATION=CE-707U ----------

OBS	SR	V	ZN	SD	BI	GA	GE	MOL	SNI	TIW	R	HCO3	CO3	OH	SO4	SO3	S	TSS
21	0.96	0.5	0.01	.	0.01	0.5	0.1	0.1	.	0.5	.	10	495	1	0.5	353	.	1.8	.
22	.	.	.	.	.	.	.	.	.	.	.	.	482	1	0.5	250	.	.	.
23	.	.	.	.	.	.	.	.	.	.	.	.	476	.	.	263	.	.	.
24	.	.	.	.	.	.	.	.	.	.	.	.	482	.	.	291	.	.	.
25	.	.	.	.	.	.	.	.	.	.	.	.	463	.	.	336	.	.	8
26	0.70	.	0.04	.	.	.	.	.	.	.	.	.	555	.	.	375	.	.	.

OBS	TCN	TSO4	TDS	ALK	HARD	PO4	NH3	NO2	NO3	TOC	DOC	CN	PHE	OG	BOD	COD	SIO2	KJEL	ORTHOP	ALPHA	BETA
21	.	.	884	427	445	0.04	2.80	1	0.1	.	12	0.05	0.1	.	.	12	11	.	.	2	8
22	.	.	824	413	397	0.01	0.30	5	0.1	.	23	.	.	.	.	.	9	.	.	.	.
23	.	.	792	412	381	.	2.40	.	.	.	8	.	.	.	.	.	14	.	.	.	.
24	.	.	760	399	377	0.20	0.16	.	.	.	6	.	.	.	.	.	10	.	.	.	.
25	.	.	864	395	500	.	0.21	.	.	.	5	.	.	.	.	.	10	.	.	.	.
26	.	.	1057	464	598	0.02	3.78	.	.	.	7	.	.	.	.	.	11	.	.	1	0

RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM
WATER CHEMISTRY DATA - TRACT C-A
UPPER AQUIFER WATER QUALITY DATA
DEWATERING/REINJECTION/DISCHARGE PROGRAM

---------- REPORT YEAR=1981 TYPE=UPPA STATION=CE-708U ----------

OBS	DATE	TEMP	PH	SPC COND	WLL	AL SAE	AB BR	BD	BCA	CL	CRU	F	FEB	LI
27	19NOV81	11.8	7.7	1250	.	.	.	.	71	11.1	.	0.45	.	0.07

OBS	MG	MN	HG	NI	K	SEG	NA	SR	V	ZN	SBI	GAE	MOL	STN	ZWR	HCO3	CO3	OH
27	62	0.04	.	.	0.34	.	140	2.58	.	0.04	.	.	.	.	.	509	.	.

OBS	SO4	SO3	S	TSS	TCN	TS4	TDS	AL K	HARD	P O4	NH3	NO2	NO3	TCC	DCN	P HEG	BOD	CCD	SI O2	K JEL	ORTHO PHA	ALK PHT	BE TA
27	286	.	.	.	.	.	903	429	432	0.07	0.36	.	.	.	.	.	.	.	34	.	.	1	0

RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM
WATER CHEMISTRY DATA - TRACT C-A
UPPER AQUIFER WATER QUALITY DATA
DEWATERING/REINJECTION/DISCHARGE PROGRAM

---------- REPORT YEAR=1981 TYPE=UPPA STATION=GS-D1U ----------

OBS	DATE	TEMP	PH	SPC COND	WL	AL	SA	BE	B	BR	CD	CA	CL	CR	CU	F	FE	PB
28	09NOV81	15.3	8.7	1300	.	.	.	.	0.27	.	.	35	8.45	.	.	1.06	.	.

OBS	LI	MG	MN	HG	NI	K	SE	SA	SR	V	ZN	SB	BI	GA	GE	MO	LN	ST	IW	ZR	HCO3	CO3
28	0.12	86	0.01	.	.	0.27	.	.	150	3.01	.	0.02	.	.	.	.	.	.	.	.	.	500	.

OBS	OH	SO4	SO3	SS	TSC	TSN	TDS	AL	HARD	PO4	NH3	NO2	NO3	TCC	DCC	CN	PHEG	BOD	COD	SI	KJEL	OPTH	ALPA	BETA
28	.	351	.	.	.	.	956	425	441	0.03	.	.	.	.	10	.	.	.	.	25	.	.	0	0

RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM
WATER CHEMISTRY DATA - TRACT C-A
UPPER AQUIFER WATER QUALITY DATA
DEWATERING/REINJECTION/DISCHARGE PROGRAM

---------- REPORT YEAR=1981 TYPE=UPPA STATION=GS-D3U ----------

OBS	DATE	TEMP	PH	SPC COND	WALL	AALS	ABAE	B	BBR	CDA	CL	CRU	F	FEB	PB
29	09NOV81	15.2	8.4	1300	.	.	.	0.23	.	.	21	8.45	.	2.66	.	.

OBS	LI	MG	MN	HCI	NIK	SEG	SAA	SR	V	ZN	SBI	BIA	GAE	GLN	MOSI	STW	ZR	HCO3	CO3
29	0.14	61	0.02	.	0.44	.	190	3.26	.	0.01	.	.	.	.	.	.	.	477	.

OBS	OH	SO4	SO3	S	TSSN	TSC	TSO4	TDS	ALK	HARD	P04	NH3	NO2	NO3	TOC	DCN	PHE	OGD	BCOD	SI02	KJEL	ORTHO P	ALPHA	BETA
29	.	325	.	.	.	.	.	933	419	303	0.03	.	.	.	6	.	.	.	.	15	.	.	1	2

RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM
WATER CHEMISTRY DATA - TRACT C-A
UPPER AQUIFER WATER QUALITY DATA
DEWATERING/REINJECTION/DISCHARGE PROGRAM

---------- REPORT YEAR=1981 TYPE=UPPA STATION=GS-D6U ----------

	DATE	TEMP	PH	SPC COND	WL	A LS	A SA	B EB	B	B R	C D	C A	C L	C R	C U	F	F E	P B	L I
0	29JAN81	16.5	7.6	1350	.	.	.	.	0.26	.	.	57	5.97	.	.	0.18	0.14	.	.
1	24MAR81	17.2	7.7	1350	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
2	05MAY81	17.0	7.5	1400	.	.	.	.	0.24	0.8	.	44	7.28	.	.	0.11	.	.	0.12
3	19AUG81	17.0	7.4	1320	.	.	.	.	0.19	.	.	44	9.13	.	.	0.80	.	.	.
4	11NOV81	17.1	7.8	1375	.	.	.	.	0.31	.	.	44	8.64	.	.	0.81	.	.	0.11

	MG	MN	HG	NI	K	SE	AG	NA	SR	V	ZN	SB	BI	AG	EG	MOL	ST	IW	ZR	HCO3	CO3	OH	SO4	SO3
0	86	.	.	.	0.25	.	.	190	.	.	.	.	.	.	.	.	.	.	.	521	1	0.5	443	.
1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	508	.	.	.	.
2	56	.	.	.	0.30	.	.	210	5.50	.	.	.	.	.	.	.	.	.	.	527	.	.	263	.
3	57	.	7.9	.	0.31	.	.	217	.	.	.	.	.	.	.	.	.	.	.	508	.	.	345	.
4	58	.	.	.	0.28	.	.	200	5.02	.	0.01	.	.	.	.	.	.	.	.	513	.	.	319	.

	S	TSS	TCN	TSO4	TDS	AL K	HARD	P C4	N H3	N O2	N O3	TOC	DOC	N	PHE	O G	BCD	CO2	SI	KJEL	ORTHO P	ALH A	BET A
0	.	.	.	.	1012	446	496	0.01	1.40	11.000	0.2	.	5	.	.	.	.	.	34	.	.	.	.
1	.	.	.	0	.	449	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
2	41	.	.	.	940	451	340	.	0.07	0.061	0.2	.	1	.	0	.	.	6	32	.	.	2	4
3	.	878	.	.	1054	434	344	0.02	0.15	.	0.2	.	.	.	.	.	.	.	27	.	.	.	.
4	.	.	.	.	950	442	348	0.05	0.15	.	0.2	.	4	.	.	.	.	.	31	.	.	5	2

RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM
WATER CHEMISTRY DATA - TRACT C-A
UPPER AQUIFER WATER QUALITY DATA
DEWATERING/REINJECTION/DISCHARGE PROGRAM

---------- REPORT YEAR=1981 TYPE=UPPA STATION=GS-07U ----------

OBS	DATE	TEMP	PH	SPEC COND	WL	ALL	ASS	BAE	BBR	BCD	CAL	CRU	CUF	FEB	PBT
35	24MAR81	15.5	8.2	1300	.	.	.	.	.	.	.	.	.	.	.

OBS	LIGNITE	MMGNIK	MHGNIK	NSEGA	SARV	ANBI	ZNAE	SBIL	GAEN	GOLI	MSWR	HCO3	CO3	OH
35	.	.	.	.	.	.	.	.	.	.	.	839	1.03	.

OBS	SOS4	SOS3	TSSN	TTSC4	TSOD	TSTS	ALK	HARD	APH4	PH43	NH23	NO3C	NO2C	TDSN	PHEG	CACO	BDD	CCD	SIO2	KLE	ORTHOP	ALPHA	BETA
35	.	.	.	.	0	.	742	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM
WATER CHEMISTRY DATA - TRACT C-A
UPPER AQUIFER WATER QUALITY DATA
DEWATERING/REINJECTION/DISCHARGE PROGRAM

---------- REPORT YEAR=1981 TYPE=UPPA STATION=GS-D8U ----------

DATE	TEMP	PH	SPC COND	WL	AL	AS	BA	BE	B	BR	CD	CA	CL	CR	CU
29JAN81	15.0	7.3	1400	.	.	.	.	.	0.17	.	.	57	22.90	.	.
24MAR81	15.0	7.7	1550	.	.	.	.	.	.	.	.	.	.	.	.
05MAY81	15.0	8.1	1450	.	.	.	.	.	0.38	0.9	.	53	10.60	.	.
11NOV81	14.8	7.7	1475	.	.	.	.	.	0.37	.	.	53	9.25	.	.

F	FE	PB	LI	MG	MN	HG	NI	K	SE	AG	NA	SR	V	ZN	SB
0.21	0.14	.	.	90	.	.	.	0.25	.	.	190	.	.	.	.
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
0.27	0.20	.	0.10	83	0.04	.	.	0.49	.	.	205	5.20	.	.	.
0.94	.	.	0.09	90	0.02	.	.	0.26	.	.	180	4.51	.	0.05	.

RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM
WATER CHEMISTRY DATA - TRACT C-A
UPPER AQUIFER WATER QUALITY DATA
DEWATERING/REINJECTION/DISCHARGE PROGRAM

---------- REPORT YEAR=1981 TYPE=UPPA STATION=GS-D8U ----------

OBS	BI	GA	GE	OL	SN	TI	W	ZR	HCO3	CO3	OH	SO4	SO3	S	TSS	TSCN	TSO4	TDS	AL K	HARD
36	.	.	.	.	.	.	.	.	665	1	0.5	391	.	.	.	.	.	1120	566	513
37	.	.	.	.	.	.	.	.	649	.	.	.	.	.	.	.	0	.	555	.
38	.	.	.	.	.	.	.	.	674	.	.	370	.	5.7	.	.	.	1064	572	473
39	.	.	.	.	.	.	.	.	644	.	.	360	.	.	.	.	.	1085	549	502

OBS	PO4	NH3	NO2	NO3	TOC	DOC	CN	PHE	OG	BCD	COD	SIO2	KJEL	ORTHOP	ALPHA	BETA
36	0.11	1.40	1.00	0.1	.	16	.	.	.	.	.	34	.	.	.	.
37	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
38	.	0.09	0.01	0.0	.	3	.	0.1	.	.	16	36	.	.	2	2
39	0.07	2.29	.	.	.	6	.	.	.	.	.	35	.	.	0	1

RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM
WATER CHEMISTRY DATA - TRACT C-A
UPPER AQUIFER WATER QUALITY DATA
DEWATERING/REINJECTION/DISCHARGE PROGRAM

---------- REPORT YEAR=1981 TYPE=UPPA STATION=GS-D9U ----------

	DATE	TEMP	PH	SPC COND	WL	ALS	ABE	BB	B	BRD	CACR	CU	F	FEB
0	24MAR81	10.4	7.3	1230	.	.	.	.	.	.	.	.	.	.

	LIC	MCN	HGI	NIK	SEG	ANA	RRV	ZNE	SBI	GAE	MCL	CNI	TIW	ZR	HCO3	CO3	OH	SCO4
0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	485	.	.	.

	SO3	TSS	TSN	TSO4	TDS	ALK	HARD	PH	NH3	NO2	NO3	TCC	DCC	PNE	HOG	BOD	CCD	SI2	KLE	ORTHO P	ALPHA	BETA
0	.	.	.	0	.	419	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM
WATER CHEMISTRY DATA - TRACT C-A
UPPER AQUIFER WATER QUALITY DATA
DEWATERING/REINJECTION/DISCHARGE PROGRAM

---------- REPORT YEAR=1981 TYPE=UPPA STATION=GS-MDP2CU ----------

OBS	DATE	TEMP	PH	SPC COND	WL	AL	AS	AB	BE	B	BR	CD	CA	CL	CR	CU	F	FE	PB	LI
41	09NOV81	16.2	8.3	1600	.	.	.	.	.	0.31	.	.	67	9.58	.	.	2.48	.	.	0.2

OBS	MG	MN	HG	NI	K	SE	AG	NA	SR	V	ZN	SB	BI	AA	GE	MOL	STN	IW	ZR	HCO3	CO3	OH
41	96	0.01	.	.	0.42	.	.	190	3.78	.	0.02	.	.	.	.	.	.	.	.	.	470	.	.

OBS	SO4	SO3	S	TSS	TSCN	TDS	TAL	HARD	PO4	NH3N	NO2N	NO3N	TCC	DCN	PHE	BOD	CO2	SI	KJEL	ORTHOPA	ALPHA	BETA
41	559	.	.	.	.	.	1299	399	562	0.05	.	.	0.8	.	9	.	.	.	.	28	.	.	1	12

RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM
WATER CHEMISTRY DATA - TRACT C-A
UPPER AQUIFER WATER QUALITY DATA
DEWATERING/REINJECTION/DISCHARGE PROGRAM

---------- REPORT YEAR=1981 TYPE=UPPA STATION=GS-M10U ----------

OBS	DATE	TEMP	PH	SPCOND	WALL	AS	BA	BE	B	BR	CD	CA	CL
42	29JAN81	8.1	7.4	1350	.	0.1	0.01	0.1	0.01	0.19	0.2	0.01	71	10.5
43	03NOV81	9.2	7.6	1350	.	.	.	.	.	0.22	.	.	67	11.3

OBS	CR	CU	F	FE	PB	LI	MG	MN	HG	NI	K	SE	AG	NA
42	0.01	0.01	0.20	0.44	0.1	0.08	79	0.10	0.3	0.05	0.53	0.01	.	140
43	.	.	0.89	.	.	0.08	84	0.02	.	.	0.34	.	.	120

OBS	SR	V	ZN	SBI	GA	GE	MOL	NI	STI	W	ZR	HCO3	CO3	OH	SO4	SO3	S	TSS
42	2.56	0.5	0.01	.	0.01	0.5	0.1	0.1	.	0.5	.	10	443	1	0.5	425	.	0.1	.
43	1.53	.	0.02	.	.	.	.	.	.	.	.	.	470	.	.	384	.	.	.

OBS	TCN	TSO4	TDS	ALK	HARD	P O4	NH3	NO2	NO3	TOC	DOC	PH	BOD	CCOD	SI	SKJEL	ORTHOP	ALPHA	BETA
42	.	.	960	384	502	0.03	0.50	3	0.1	.	8	0.05	8.1	.	.	12	20	.	.	4	10
43	.	.	956	394	513	0.06	1.34	.	.	.	.	.	.	.	.	.	27	.	.	3	0

RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM
WATER CHEMISTRY DATA - TRACT C-A
UPPER AQUIFER WATER QUALITY DATA
DEWATERING/REINJECTION/DISCHARGE PROGRAM

---------- REPORT YEAR=1981 TYPE=UPPA STATION=GS-M11U ----------

OBS	DATE	TEMP	PH	SPC COND	WALL	AS	EA	BE	B	BR	CD	CA	CL
44	29JAN81	8.1	7.5	1320	.	0.2	0.01	0.1	0.01	0.17	0.2	0.01	81	10.5
45	03NOV81	8.4	7.8	1350	.	.	.	.	.	0.18	.	.	87	10.7

OBS	CR	CU	F	FE	FB	LI	MG	MN	HG	NI	K	SE	AG	NA
44	0.01	0.01	0.10	0.05	0.1	0.06	74	0.07	0.3	0.05	1.33	0.01	.	120
45	.	.	0.35	.	.	0.06	75	.	.	.	1.11	.	.	105

OBS	SR	V	ZN	SB	SI	GA	GE	MOL	STN	I	WR	HCO3	CO3	OH	SO4	SO3	S	TSS
44	1.57	0.5	0.02	.	0.01	0.5	0.1	0.1	.	0.5	.	10	465	1	0.5	413	.	0.1	.
45	0.45	.	0.08	.	.	.	.	.	.	.	.	.	476	.	.	365	.	.	.

OBS	TCN	TSO4	TDS	ALK	HARD	PCA	NH3	NO2	NO3	TOC	DOC	PHE	OG	BOD	COD	SIO2	KJEL	ORTHOPHA	ALPHA	BETA
44	.	.	952	406	507	0.03	0.60	1	1.6	.	9	0.05	0.1	.	.	37	14	.	.	2	12
45	.	.	938	404	525	0.07	0.98	.	2.4	.	4	.	.	.	.	.	17	.	.	10	7

RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM
WATER CHEMISTRY DATA - TRACT C-A
UPPER AQUIFER WATER QUALITY DATA
DEWATERING/REINJECTION/DISCHARGE PROGRAM

---------- REPORT YEAR=1981 TYPE=UPPA STATION=GS-M12U ----------

OBS	DATE	TEMP	PH	SPC COND	WAL	AS	BA	BE	B	BR	CD	CA	CL
46	29JAN81	12.4	7.2	1400	.	0.1	0.01	0.1	0.01	0.19	0.2	0.01	70	4.85
47	22OCT81	.	.	-200	.	.	.	.	.	.	.	.	56	6.88

OBS	CR	CU	F	FE	PB	LI	MG	MN	HG	NI	K	SE	AG	NA
46	0.01	0.01	0.12	0.28	0.1	0.13	72	0.02	0.3	0.05	0.44	0.01	.	190
47	.	.	0.41	.	.	0.14	73	0.02	0.5	.	1.10	.	.	180

OBS	SR	V	ZN	SB I	BA	GE	MOL	SN I	TI	WR	HCO3	CO3	CO4	SO4	SO3	S
46	3.17	0.5	0.01	.	0.01	0.5	0.1	0.1	.	0.5	.	10	588	1	0.5	412	.	0.1
47	3.00	.	0.01	.	.	.	.	.	.	.	.	.	616	.	.	324	.	.

OBS	TSS	TSCN	TSO4	TDS	ALK	HARD	PO4	NH3	NO2	NO3	TOCC	DOCN	PHE	BOD	COD	SI O2	SKJ EL	CRTH PA	ALPHA	BETA
46	.	.	.	1128	502	471	0.25	0.7	1	0.1	.	9	0.05	9.1	.	.	8	43	.	.	3	8
47	.	.	.	990	534	440	0.39	.	.	0.2	.	3	.	.	.	.	.	42	.	.	0	2

RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM
WATER CHEMISTRY DATA - TRACT C-A
UPPER AQUIFER WATER QUALITY DATA
DEWATERING/REINJECTION/DISCHARGE PROGRAM

---------- REPORT YEAR=1981 TYPE=UPPA STATION=GS-M2U ----------

OBS	DATE	TEMP	PH	SPC CON	WL	AL	AS	AB	AE	BB	BR	CD	CA	CL	CR	CU	F	FE	PB	LI
48	29JAN81	11.3	9.2	1450	.	.	.	.	.	0.10	.	.	4.9	7.21	.	.	0.03	.	.	.
49	25FEB81	11.8	9.5	1480	.	.	.	.	.	0.23	.	.	5.5	20.70	.	.	0.19	0.05	.	.
50	30MAR81	10.6	9.4	1450	.	.	.	.	.	0.22	.	.	5.6	19.60	.	.	0.09	.	.	.
51	13APR81	12.1	9.5	1350	.	.	.	.	.	.	.	.	5.8	20.70	.	.	0.05	.	.	.
52	27OCT81	11.7	9.4	1575	.	.	.	.	.	0.08	.	.	3.9	16.70	.	.	0.13	.	.	0.08

OBS	MG	MN	HG	NI	K	SE	AG	NA	SR	V	ZN	SB	BI	AG	EL	MO	SN	TI	W	ZR	HCO3	CO3	OH	SO4	SO3
48	120	.	.	.	3.0	.	.	220	.	.	.	.	.	.	.	.	.	.	.	.	338	10.90	.	660	.
49	89	.	.	.	6.8	.	.	198	.	.	.	.	.	.	.	.	.	.	.	.	275	11.30	0.5	500	.
50	91	.	.	.	5.1	.	.	200	.	.	.	.	.	.	.	.	.	.	.	.	254	13.20	.	527	.
51	94	.	.	.	5.2	.	.	220	.	.	.	.	.	.	.	.	.	.	.	.	259	13.00	.	569	.
52	120	0.04	.	.	2.6	.	.	200	0.07	.	.	.	.	.	.	.	.	.	.	.	458	9.61	.	491	.

OBS	SS	TSS	TSCN	TS04	TDS	AL K	AHARD	PO4	NH3	NO2	NO3	TOC	DOC	CN	PHENOG	BOD	CCD	SIO2	KJEL	TORTHOP	ALPHA	BETA
48	.	.	.	.	1180	481	506	0.01	.	.	.	.	11	.	.	.	.	.	2.0	.	.	.	.
49	.	.	.	.	976	434	380	0.07	1.40	2.000	0.1	.	8	.	.	.	.	.	0.5	.	.	.	.
50	.	.	.	.	1084	450	388	.	1.75	0.005	.	.	9	.	.	.	.	.	.	.	.	.	.
51	.	.	.	.	1028	447	401	0.07	1.23	.	.	.	1	.	.	.	.	.	3.0	.	.	.	.
52	.	.	.	.	1101	544	503	0.10	.	.	.	.	4	.	.	.	.	.	2.0	.	.	0	23

RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM
WATER CHEMISTRY DATA - TRACT C-A
UPPER AQUIFER WATER QUALITY DATA
DEWATERING/REINJECTION/DISCHARGE PROGRAM

---------- REPORT YEAR=1981 TYPE=UPPA STATION=GS-M3U ----------

	DATE	TEMP	PH	SPC COND	WL	ALS	ASA	BAE	BB	BR	CD	CA	CL	CRU	CF	FE	FB
3	29JAN81	8.1	9.6	1275	.	.	.	.	0.01	.	.	3.70	9.47	.	0.36	.	.
4	25FEB81	8.8	9.8	1330	.	.	.	.	0.23	.	.	4.30	12.90	.	0.84	0.05	.
5	30MAR81	8.4	9.6	1400	.	.	.	.	0.32	.	.	3.86	14.00	.	0.67	.	.
6	13APR81	8.4	9.6	1300	.	.	.	.	.	.	.	4.40	25.20	.	0.46	.	.
7	03NOV81	8.8	9.7	1300	.	.	.	.	0.68	.	.	5.20	13.00	.	1.56	.	.

	LI	MG	MNG	HNI	K	SEG	AGA	NAR	SV	ZNB	SBI	BAE	GEL	GMO	OST	NIT	TWR	ZR	HCO3	CO3	OH	SO4
3	.	52	.	.	1.43	.	.	244	.	.	.	.	.	.	.	.	.	.	349	16.7	.	360
4	.	51	.	.	1.55	.	.	270	.	.	.	.	.	.	.	.	.	.	325	15.4	0.5	464
5	.	51	.	.	1.75	.	.	269	.	.	.	.	.	.	.	.	.	.	305	16.8	.	469
6	.	50	.	.	1.80	.	.	270	.	.	.	.	.	.	.	.	.	.	336	13.8	.	417
7	0.16	48	.	.	1.26	.	.	250	1.76	.	.	.	.	.	.	.	.	.	464	17.4	.	312

	SO3	TSS	TSN	TSO4	TDS	TALK	HARD	PCA	NH3	NO2	NO3	TOC	DOC	PCN	PHE	OGD	BOD	CCD	SIO2	KJEL	ORTHO P	ALPHA	BETA
3	.	.	.	.	780	571	223	0.08	.	.	.	.	7	.	.	.	.	.	2.0	.	.	.	.
4	.	.	.	.	928	543	221	0.08	0.20	6.000	0.1	.	9	.	.	.	.	.	0.5	.	.	.	.
5	.	.	.	.	1092	554	219	0.07	0.26	0.006	.	.	12	.	.	.	.	.	.	.	.	.	.
6	.	.	.	.	1000	519	216	0.07	0.24	0.001	.	.	3	.	.	.	.	.	2.0	.	.	.	.
7	.	.	.	.	884	679	210	0.13	2.78	.	.	.	3	.	.	.	.	.	2.0	.	.	0	0

RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM
WATER CHEMISTRY DATA - TRACT C-A
UPPER AQUIFER WATER QUALITY DATA
DEWATERING/REINJECTION/DISCHARGE PROGRAM

---------- REPORT YEAR=1981 TYPE=UPPA STATION=GS-M4U ----------

OBS	DATE	TEMP	PH	SPCOND	WL	ALAS	BA	BE	B	BR	CD	CA	CL	CR
58	29JAN81	14.0	7.3	1950	.	.	.	.	0.01	.	.	126	7.10	.
59	25FEB81	14.3	9.1	1500	.	.	.	.	0.23	.	.	35	10.60	.
60	30MAR81	13.8	9.0	1450	.	.	.	.	0.13	.	.	31	11.80	.
61	13APR81	15.2	8.4	1525	.	.	.	.	.	.	.	54	10.10	.
62	21JUL81	15.6	7.2	1950	.	.	.	.	0.23	.	.	104	9.19	.
63	27OCT81	14.5	7.5	1900	.	.	.	.	1.61	.	0.01	87	10.50	.

OBS	CU	F	FE	PB	LI	MG	MN	HG	NI	K	SE	AG	NA	SR	V
58	.	0.05	0.28	.	.	107	.	.	.	0.92	.	.	250	.	.
59	.	0.09	0.05	.	.	75	.	.	.	1.73	.	.	230	.	.
60	.	0.10	.	.	.	74	.	.	.	1.84	.	.	230	.	.
61	.	0.08	.	.	.	85	.	.	.	1.52	.	.	240	.	.
62	.	0.05	.	.	.	104	.	.	.	0.87	.	.	240	.	.
63	.	0.21	.	.	0.17	102	0.09	.	.	0.88	.	.	240	3.74	.

RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM
WATER CHEMISTRY DATA - TRACT C-A
UPPER AQUIFER WATER QUALITY DATA
DEWATERING/REINJECTION/DISCHARGE PROGRAM

---------- REPORT YEAR=1981 TYPE=UPPA STATION=GS-M4U ----------

	ZN	SB	BI	GA	GE	MOL	STN	IW	ZR	HCO3	CO3	OH	SO4	SO3	S	TSS	TCN	TSO4	TDS
8	.	.	.	.	.	.	.	.	.	714	.	.	663	.	.	.	.	.	1616
7	.	.	.	.	.	.	.	.	.	422	3.56	0.5	448	.	.	.	.	.	1044
9	.	.	.	.	.	.	.	.	.	419	4.21	.	512	.	.	.	.	.	1072
1	.	.	.	.	.	.	.	.	.	554	.	.	486	.	.	.	.	.	1140
2	.	.	.	.	.	.	.	.	.	646	.	.	659	.	.	34	.	.	1567
3	0.15	.	.	.	.	.	.	.	.	653	.	.	618	.	.	.	.	.	1494

	ALK	HARD	PO4	NH3	NO2	NO3	TOC	DOC	CN	PHE	CG	BOD	COD	SIO2	KJEL	OPTHOP	ALPHA	BETA
8	608	755	0.01	.	1.000	.	.	4	.	.	.	.	.	35	.	.	.	.
7	424	396	0.11	0.10	5.000	0.1	.	8	.	.	.	.	.	11	.	.	.	.
9	434	381	0.34	0.12	0.004	.	.	13	.	.	.	.	.	.	.	.	.	.
1	489	484	.	0.16	0.001	.	.	4	.	.	.	.	.	20	.	.	.	.
2	549	687	.	0.10	.	0.1	.	.	.	.	.	.	.	20	.	.	.	.
3	554	637	0.07	.	.	.	.	6	.	.	.	.	.	30	.	.	0	2

RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM
WATER CHEMISTRY DATA - TRACT C-A
UPPER AQUIFER WATER QUALITY DATA
DEWATERING/REINJECTION/DISCHARGE PROGRAM

---------- REPORT YEAR=1981 TYPE=UPPA STATION=GS-M9U ----------

OBS	DATE	TEMP	PH	SPC COND	WALL	AS	BA	BE	B	BR	CD	CA	CL
64	29JAN81	11.1	6.7	3000	.	0.1	0.01	0.1	0.01	0.33	0.2	0.01	266	9.24
65	03NOV81	12.2	7.0	3000	.	.	.	.	.	0.40	.	.	240	10.20

OBS	CR	CU	F	FE	PB	LI	MG	MN	HG	NI	K	SE	AG	NA
64	0.01	0.01	0.09	0.11	0.1	0.15	203	0.05	0.3	0.05	1.86	0.01	.	260
65	.	.	0.13	.	.	0.13	200	0.02	.	.	1.64	.	.	230

OBS	SR	V	ZN	SB	BI	GA	GE	MO	NI	ST	W	ZR	HCO3	CO3	OH	SO4	SO3	S
64	3.41	0.5	0.01	.	0.01	0.5	0.1	0.1	.	0.5	.	10	910	1	0.5	1364	.	0.1
65	3.00	.	0.08	.	.	.	.	.	.	.	.	.	885	.	.	1209	.	.

OBS	TSS	TSCN	TOS4	TDS	ALK	HARD	PO4	NH3	NO2	NO3	TOC	TDC	DOC	PHE	OGD	BOD	COD	SI02	K	TH	ORTHOPA	ALB	BET
64	.	.	.	2644	771	1500	0.2	0.9	1	0.1	.	4	0.05	0.1	.	.	1	56	.	.	6	11	
65	.	.	.	2570	744	1422	0.1	1.8	.	.	.	4	.	.	.	.	.	56	.	.	2	3	

RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM
WATER CHEMISTRY DATA - TRACT C-A
UPPER AQUIFER WATER QUALITY DATA
DEWATERING/REINJECTION/DISCHARGE PROGRAM

---------- REPORT YEAR=1981 TYPE=UPPA STATION=GS-1U ----------

OBS	DATE	TEMP	PH	SPC COND	WL	ALS	ASA	BAE	BB	BR	CD	CA	CL	HCO3	CO3	FE	PB
66	25MAR81	6.2	10.3	250	.	.	.	.	.	.	.	.	.	.	.	.	.
67	28APR81	10.0	7.6	1400	.	.	.	.	.	0.46	.	.	81	9.52	.	0.23	.	.

OBS	LIG	MN	MG	NI	K	SE	AG	NA	SR	VN	ZB	SI	BA	GE	GL	MN	CI	TW	ZR	HCO3	CO3	OH	SC4
66	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	13	1.28	.	.
67	.	80	.	.	1.27	.	.	160	.	.	.	.	.	.	.	.	.	.	.	582	.	.	387

OBS	SO3	S	TN	TSC4	TDS	AL	HARD	PO4	NH3	NO2	NO3	TDC	DCN	PHE	BOD	COD	SIO2	KJEL	TORPH	ALPHA	BETA
66	.	.	.	0	.	4806	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
67	.	.	18	.	1052	496	531	0.01	0.23	.	.	3	.	.	.	.	25	.	.	.	.

RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM
WATER CHEMISTRY DATA - TRACT C-A
UPPER AQUIFER WATER QUALITY DATA
DEWATERING/REINJECTION/DISCHARGE PROGRAM

---------- REPORT YEAR=1981 TYPE=UPPA STATION=GS-10U ----------

OBS	DATE	TEMP	PH	SPCOND	WL	AL	AS	BA	BE	B	BR	CD	CA	CL
68	30JAN81	12.3	7.0	2050	.	0.1	0.01	0.1	0.01	0.33	0.3	0.01	131	7.10
69	24FEB81	13.5	7.2	1850	.	.	.	.	.	0.43	.	.	140	7.21
70	26MAR81	.	7.1	2100	.	.	.	.	.	0.07	.	.	130	9.52
71	30APR81	.	.	.	.	.	.	.	.	0.15	.	.	120	8.40
72	10NOV81	13.3	7.4	2050	.	.	.	.	.	.	.	.	120	12.30

OBS	CR	CU	F	FE	PB	LI	MG	MN	HG	NI	K	SE	AG	NA	SR
68	0.01	0.01	0.08	11.10	0.1	0.20	116	0.19	0.3	0.05	0.80	0.01	.	260	2.40
69	.	.	0.13	6.30	.	.	114	.	.	.	0.80	.	.	250	.
70	.	.	0.13	5.30	.	.	120	.	.	.	0.90	.	.	240	.
71	.	.	0.10	4.63	.	.	120	.	.	.	0.86	.	.	250	.
72	.	.	0.25	.	.	0.17	120	0.20	.	.	0.67	.	.	230	1.66

RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM
WATER CHEMISTRY DATA - TRACT C-A
UPPER AQUIFER WATER QUALITY DATA
DEWATERING/REINJECTION/DISCHARGE PROGRAM

---------- REPORT YEAR=1981 TYPE=UPPA STATION=GS-10U ----------

OBS	V	ZN	SB	BI	GA	GE	MOL	SNI	TI	W	ZR	HCO3	CO3	OH	SO4	SO3	S	TSS	TSCN	TSO4
68	0.5	0.02	.	0.01	0.5	0.1	0.1	.	0.5	.	10	775	1	0.5	841	.	0.1	.	.	.
69	.	.	.	.	.	.	.	.	.	.	.	759	1	0.5	750	.	.	.	.	.
70	.	.	.	.	.	.	.	.	.	.	.	769	.	.	750	.	.	.	.	.
71	.	.	.	.	.	.	.	.	.	.	.	747	.	.	715	.	.	.	.	.
72	.	0.04	.	.	.	.	.	.	.	.	.	763	.	.	619	.	.	.	.	.

OBS	TDS	ALK	HARD	PO4	NH3	NO2	NO3	TOC	DOC	CN	PHE	OG	BOD	COD	SIO2	KJEL	ORTHOP	ALPHA	BETA
68	1788	662	805	0.05	0.90	20.000	0.1	.	37	0.05	0.1	.	.	24	48	.	.	8	10
69	1704	649	819	0.12	0.20	8.000	0.1	.	7	.	.	.	.	.	46	.	.	.	.
70	1616	647	818	.	2.10	.	0.1	.	4	.	.	.	.	.	47	.	.	.	.
71	1596	639	793	.	0.18	0.005	0.0	.	1	.	.	.	.	.	45	.	.	.	.
72	1576	644	793	0.07	0.94	.	.	.	12	.	.	.	.	.	48	.	.	1	1

RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM
WATER CHEMISTRY DATA - TRACT C-A
UPPER AQUIFER WATER QUALITY DATA
DEWATERING/REINJECTION/DISCHARGE PROGRAM

---------- REPORT YEAR=1981 TYPE=UPPA STATION=GS-13U ----------

OBS	DATE	TEMP	PH	SPC COND	WALL	ALSA	ABER	BRD	BCA	CL	CRU	F	FEB	LI
73	10NOV81	12.6	7.4	1650	.	.	.	.	.	87	9.87	.	0.2	.	.	0.12

OBS	MG	MN	HGI	K	SEG	NA	SR	V	ZNB	SIA	GAE	MOLN	STIW	ZP	HCO3	CO3	OH	SO4
73	91	0.01	.	0.32	.	180	2.3	.	.	.	.	.	.	.	628	.	.	467

OBS	SO3	S	TSS	TSCN	TSO4	TDS	ALK	HARD	PO4	NH3	NO2	NO3	TOC	CN	PHE	BOD	COD	TORH	TOCJ	ALPHA	BETA
73	.	.	.	.	.	1184	534	591	0.08	1.34	.	.	.	24	.	.	.	.	46	.	.	5	8

RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM
WATER CHEMISTRY DATA - TRACT C-A
UPPER AQUIFER WATER QUALITY DATA
DEWATERING/REINJECTION/DISCHARGE PROGRAM

---------- REPORT YEAR=1981 TYPE=UPPA STATION=GS-2-3U ----------

OBS	DATE	TEMP	PH	SPC $\bar{C}$ ON	WALL	ALSA	ABEB	BRD	BCA	CL	CRU	CF	FEB	PLI	MG
74	18NOV81	10	7.4	1500	.	.	.	.	.	90	8.14	.	.	0.31	.	.	0.08	81

OBS	MN	HGK	NIE	SAG	NA	SR	V	ZN	SBI	GAL	GEL	MOS	TNI	ZWR	HCO3	CO3	OH	SO4
74	0.03	.	.	0.38	.	.	150	2.42	.	0.17	.	.	.	.	.	.	.	.	574	.	.	415

OBS	SC3	TSS	TCN	TS04	TDS	ALK	HARD	PO4	NH3	NO2	NO3	TCC	DCN	PHE	BGD	CDD	SI2	KJEL	ORTHP	ALPHA	BETA
74	.	.	.	.	.	1072	484	558	0.06	0.05	.	0.3	.	6	.	.	.	.	.	29	.	.	7	0

RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM
WATER CHEMISTRY DATA - TRACT C-A
UPPER AQUIFER WATER QUALITY DATA
DEWATERING/REINJECTION/DISCHARGE PROGRAM

---------- REPORT YEAR=1981 TYPE=UPPA STATION=GS-9U ----------

OBS	DATE	TEMP	PH	SPC COND	WL	AL	AS	BA	BE	B	BR	CD	CA	CL
75	30JAN81	10.7	7.2	1200	.	0.1	0.01	0.1	0.01	0.27	0.2	0.01	100.0	8.23
76	25FEB81	11.6	7.6	1250	.	.	.	.	.	0.36	.	.	90.2	9.47
77	26MAR81	.	7.3	1200	.	.	.	.	.	0.23	.	.	91.0	7.84
78	30APR81	12.7	7.1	1200	.	.	.	.	.	0.18	.	.	69.0	10.10
79	17NOV81	11.2	7.6	1200	.	.	.	.	.	.	.	.	82.0	8.88

OBS	CR	CU	F	FE	PB	LI	MG	MN	HG	NI	K	SE	AG	NA	SR
75	0.01	0.01	0.09	3.09	0.1	0.07	65	0.14	0.3	0.05	0.41	0.01	.	120	1.29
76	.	.	0.22	2.63	.	.	66	.	.	.	0.48	.	.	122	.
77	.	.	0.16	0.80	.	.	65	.	.	.	0.57	.	.	110	.
78	.	.	0.11	2.17	.	.	62	.	.	.	0.48	.	.	110	.
79	.	.	0.30	.	.	0.05	60	0.37	.	.	0.55	.	.	101	1.03

RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM
WATER CHEMISTRY DATA - TRACT C-A
UPPER AQUIFER WATER QUALITY DATA
DEWATERING/REINJECTION/DISCHARGE PROGRAM

---------- REPORT YEAR=1981 TYPE=UPPA STATION=GS-9U ----------

OBS	V	ZN	SB	BI	GA	GE	MOL	SN	TI	W	ZR	HCO3	CO3	OH	SO4	SO3	S	TSS	TCN	TSO4
75	0.5	0.01	.	0.01	0.5	0.1	0.1	.	0.5	.	10	482	1	0.5	351	.	0.1	.	.	.
76	.	.	.	.	.	.	.	.	.	.	.	477	1	0.5	424	.	.	.	.	.
77	.	.	.	.	.	.	.	.	.	.	.	488	.	.	366	.	.	.	.	.
78	.	.	.	.	.	.	.	.	.	.	.	472	.	.	289	.	.	.	.	.
79	.	0.04	.	.	.	.	.	.	.	.	.	439	.	.	259	.	.	.	.	.

OBS	TDS	ALK	HARD	PO4	NH3	NO2	NO3	TOC	DOC	CN	PHE	OG	BOD	COD	SI02	KJEL	ORTHOP	ALPHA	ETA
75	900	417	517	0.02	0.70	5.000	0.1	.	8	0.05	0.1	.	.	8	33	.	.	3	11
76	944	412	497	0.01	0.20	6.000	0.1	.	6	.	.	.	.	.	32	.	.	.	.
77	860	419	494	.	1.00	.	.	.	10	.	.	.	.	.	23	.	.	.	.
78	832	411	427	.	0.13	0.001	.	.	4	.	.	.	.	.	23	.	.	.	.
79	706	374	451	0.29	0.32	.	.	.	4	.	.	.	.	.	26	.	.	4	1

APPENDIX 5-1.6

Multivariate Analysis of Variance (MANOVA) Variance Tests for the Upper Aquifer Water Quality

RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM
MULTIVARIATE ANALYSIS OF VARIANCE - WATER CHEMISTRY DATA
DEWATERING AND REINJECTION SYSTEM
TYPE=UPPA

GENERAL LINEAR MODELS PROCEDURE

MANOVA TEST CRITERIA FOR THE HYPOTHESIS OF NO OVERALL RPTYR EFFECT

H = TYPE I SS&CP MATRIX FOR: RPTYR
E = ERROR SS&CP MATRIX
P = DEP. VARIABLES = 11
Q = HYPOTHESIS DF = 5
NE= DF OF E = 216
S = MIN(P,Q) = 5
M = .5(ABS(P-Q)-1) = 2.5
N = .5(NE-P-1) = 102.0

HOTELLING-LAWLEY TRACE = TR(E**-1*H) = 3.58218389

F APPROXIMATION = 2(S*N+1)*TR(E**-1*H)/(S*S*(2M+S+1))
WITH S(2M+S+1) AND 2(S*N+1) DF

F(55,1022) = 13.71 PROB > F = 0.0001

PILLAI'S TRACE V = TR(H*INV(H+E)) = 1.06308368

F APPROXIMATION = (2N+S+1)/(2M+S+1) * V/(S-V)
WITH S(2M+S+1) AND S(2N+S+1) DF

F(55,1050) = 5.16 PROB > F = 0.0001

WILKS' CRITERION L = DET(E)/DET(H+E) = 0.17198915

A = -(NE-.5(P-Q+1))*LN(L) = 374.0688
U = NE-.5(P-Q+1) = 212.5000
Z = SQRT((P*P*Q*Q-4)/(P*P+Q*Q-5)) = 4.6288
B = (P*Q-2)/4 = 13.2500

F APPROXIMATION = (U*Z-2B)/(P*Q)*(1-L**1/Z)/L**1/Z
WITH P*Q AND U*Z-2B DF

F(55,957) = 8.05 PROB > F = 0.0001

RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM
MULTIVARIATE ANALYSIS OF VARIANCE - WATER CHEMISTRY DATA
DEWATERING AND REINJECTION SYSTEM
TYPE=UPPA

GENERAL LINEAR MODELS PROCEDURE

MANOVA TEST CRITERIA FOR THE HYPOTHESIS OF NO OVERALL RPTYP EFFECT

ROY'S MAXIMUM ROOT CRITERION = 0.25463961

FIRST CANONICAL VARIABLE YIELDS AN F UPPER BOUND

F(5,216) = 140.60 (UPPER BOUND)

RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM
MULTIVARIATE ANALYSIS OF VARIANCE - WATER CHEMISTRY DATA
DEWATERING AND REINJECTION SYSTEM
TYPE=UPPA

GENERAL LINEAR MODELS PROCEDURE

MANOVA TEST CRITERIA FOR THE HYPOTHESIS OF NO OVERALL AREA EFFECT

H = TYPE I SS&CP MATRIX FOR: AREA
E = ERROR SS&CP MATRIX
P = DEP. VARIABLES = 11
Q = HYPOTHESIS DF = 2
NE= DF OF E = 216
S = MIN(P,Q) = 2
M = .5(ABS(P-Q)-1) = 4.0
N = .5(NE-P-1) = 102.0

HOTELLING-LAWLEY TRACE = TR(E**-1*H) = 0.65711012

F APPROXIMATION = 2(S*N+1)*TR(E**-1*H)/(S*S*(2M+S+1))
WITH S(2M+S+1) AND 2(S*N+1) DF

F(22,410) = 6.12 PROB > F = 0.0001

PILLAI'S TRACE V = TR(H*INV(H+E)) = 0.49169636

F APPROXIMATION = (2N+S+1)/(2M+S+1) * V/(S-V)
WITH S(2M+S+1) AND S(2N+S+1) DF

F(22,414) = 6.13 PROB > F = 0.0001

WILKS' CRITERION L = DET(E)/DET(H+E) = 0.56764815

EXACT F = (1-SQRT(L))/SQRT(L)*(NE+Q-P-1)/P
WITH 2P AND 2(NE+Q-P-1) DF

F(22,412) = 6.13 PROB > F = 0.0001

ROY'S MAXIMUM ROOT CRITERION = 0.38489805

FIRST CANONICAL VARIABLE YIELDS AN F UPPER BOUND

F(2,216) = 41.78 (UPPER BOUND)

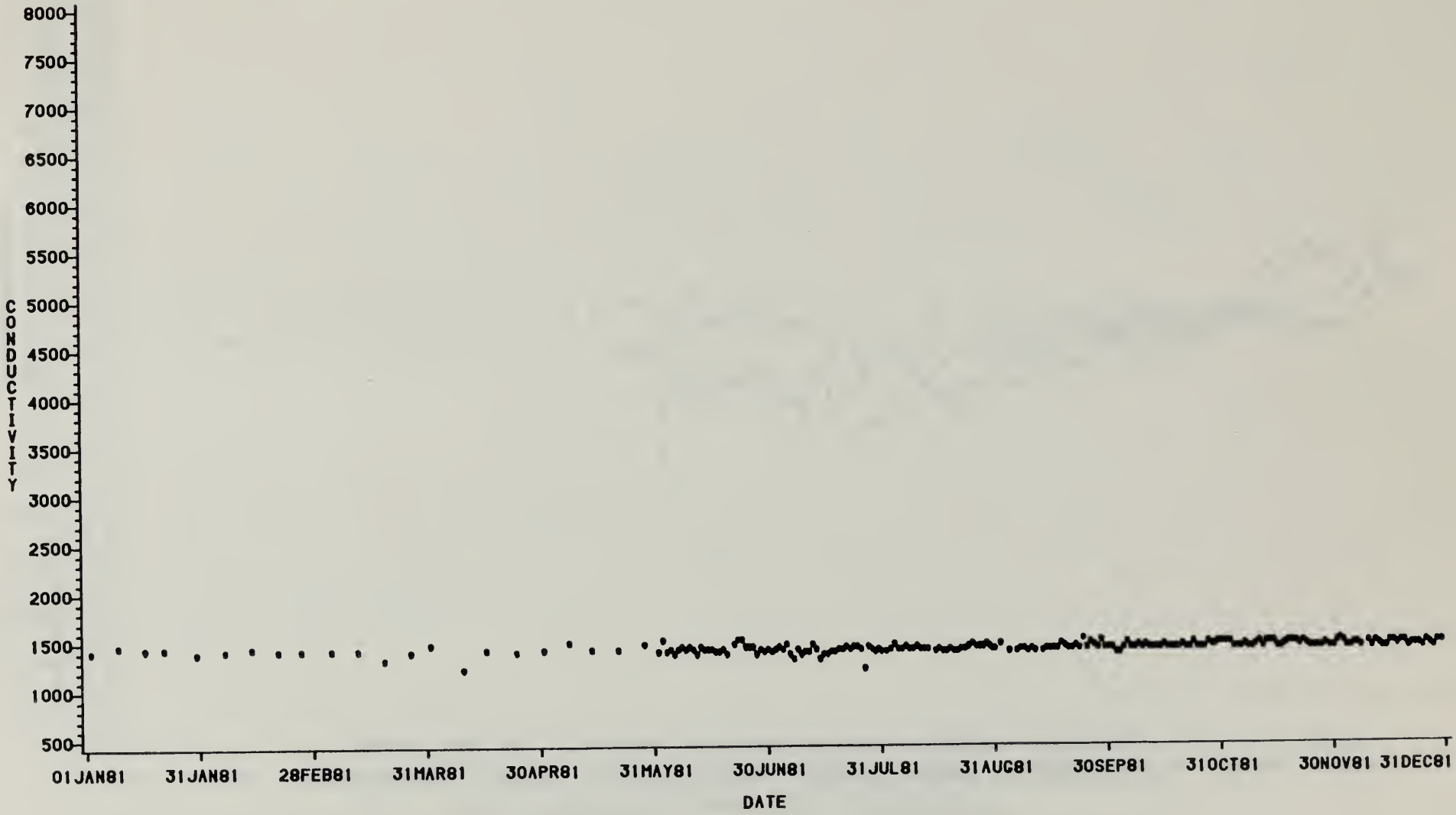
APPENDIX 5-2

Hydrology Monitoring Data
MIS Monitoring Program

APPENDIX 5-2.1

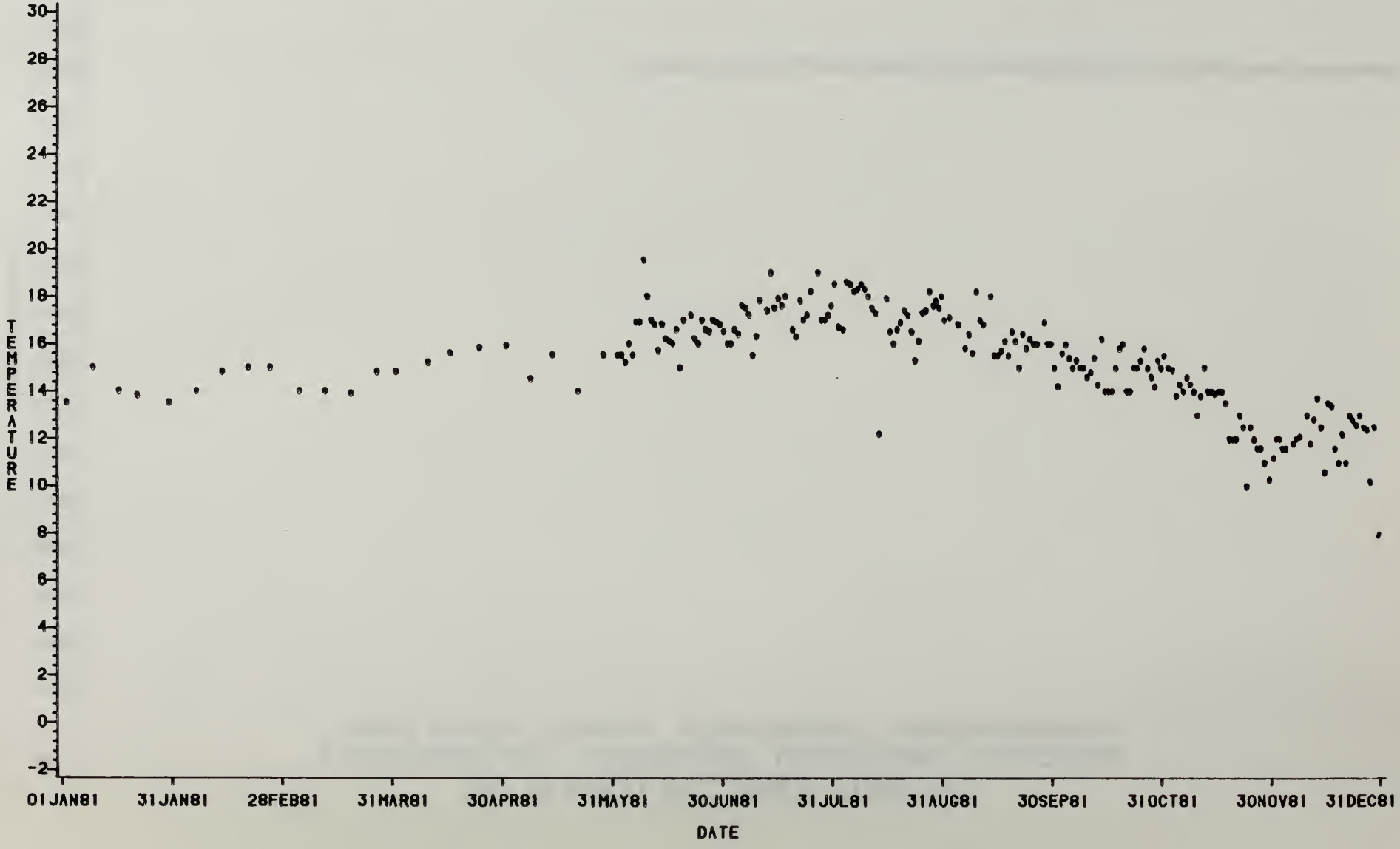
Operations Field Data for
MIS Monitoring Program

RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM
REPORT YEAR=1981 TYPE=DAMS STATION=YJEFFPOND PARAMETER=CONDUCTIVITY



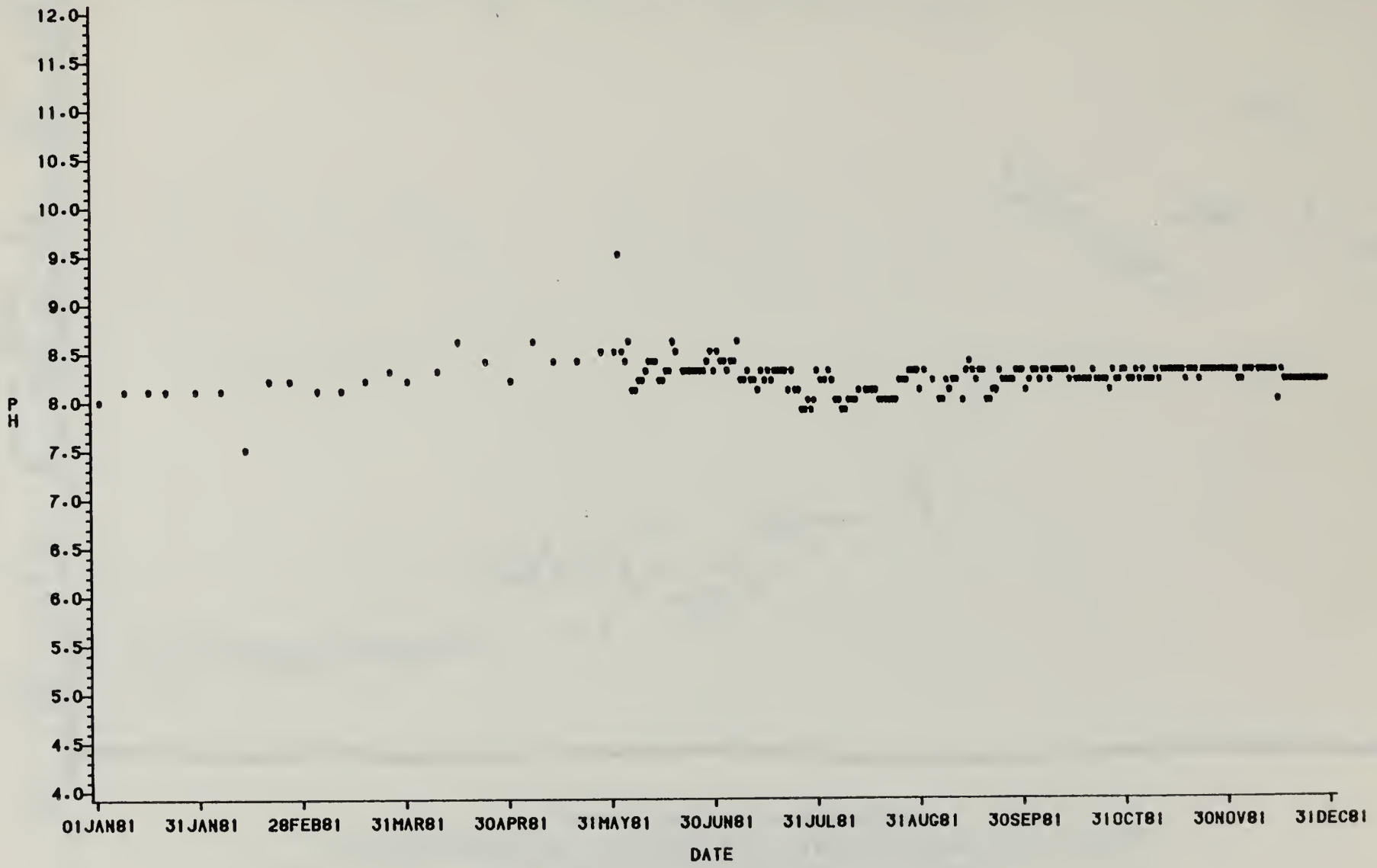
RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM

REPORT YEAR=1981 TYPE=DAMS STATION=YJEFFPOND PARAMETER=TEMPERATURE

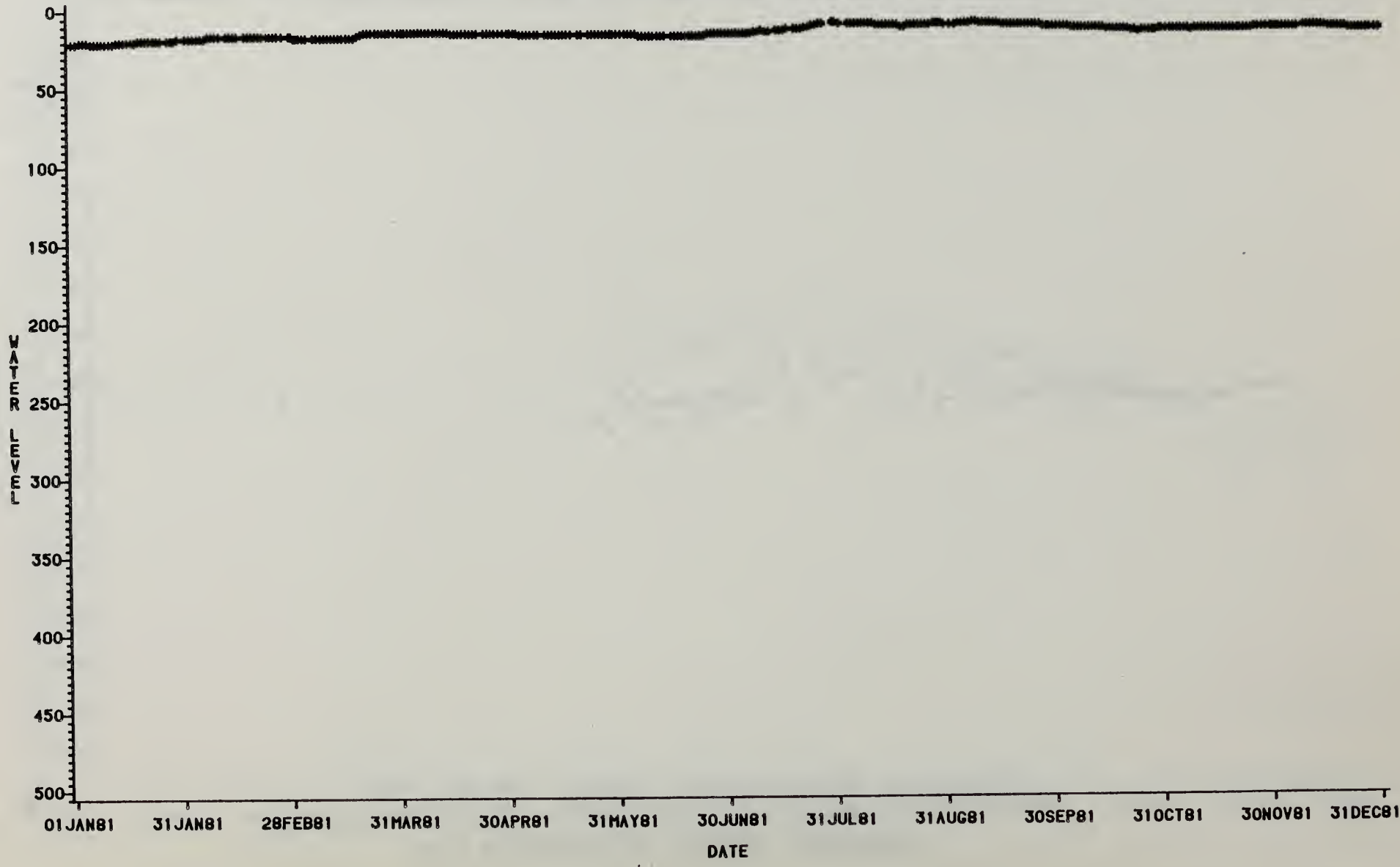


RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM

REPORT YEAR=1981 TYPE=DAMS STATION=YJEFFPOND PARAMETER=PH

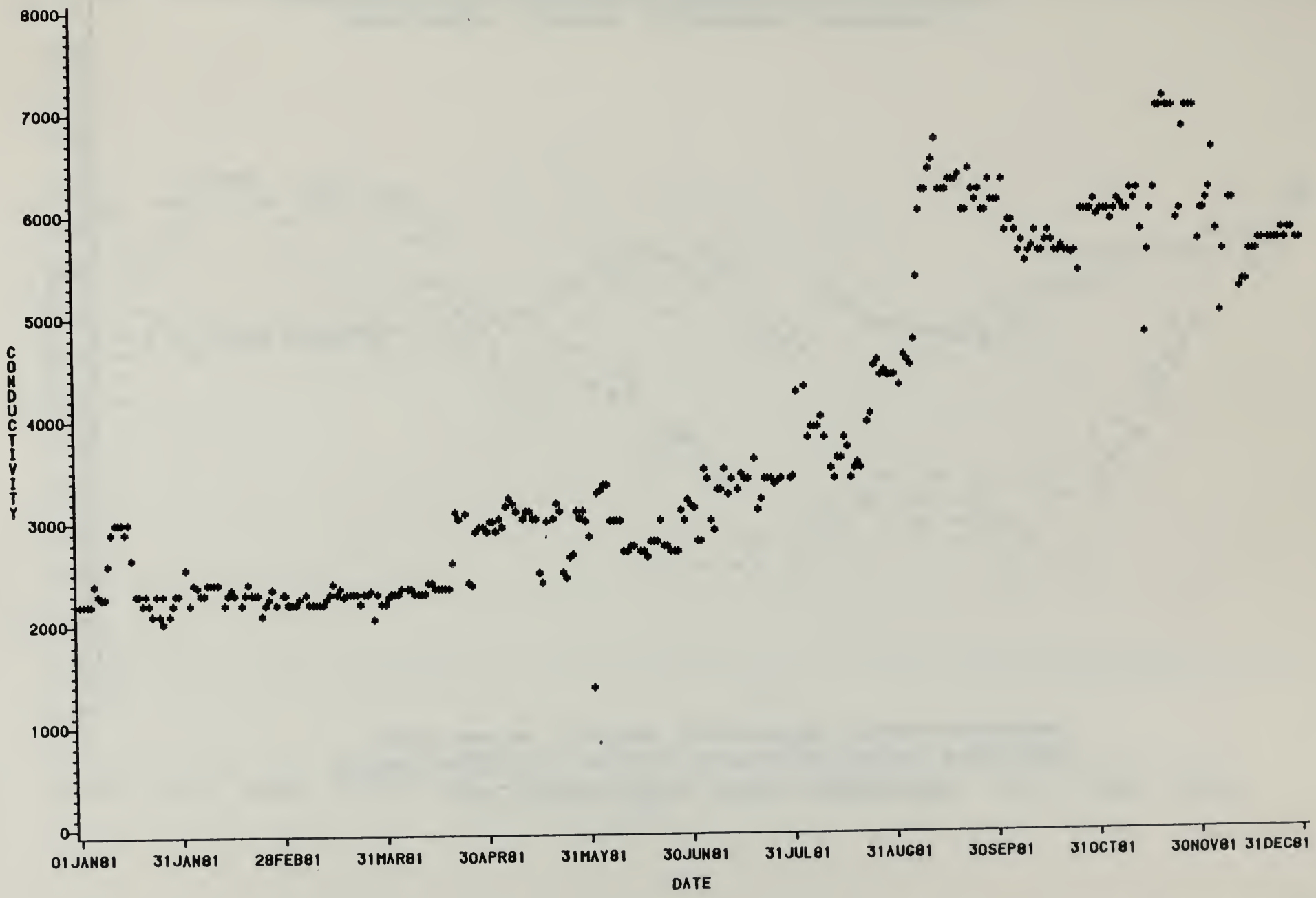


RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM
REPORT YEAR=1981 STATION=YERPOND



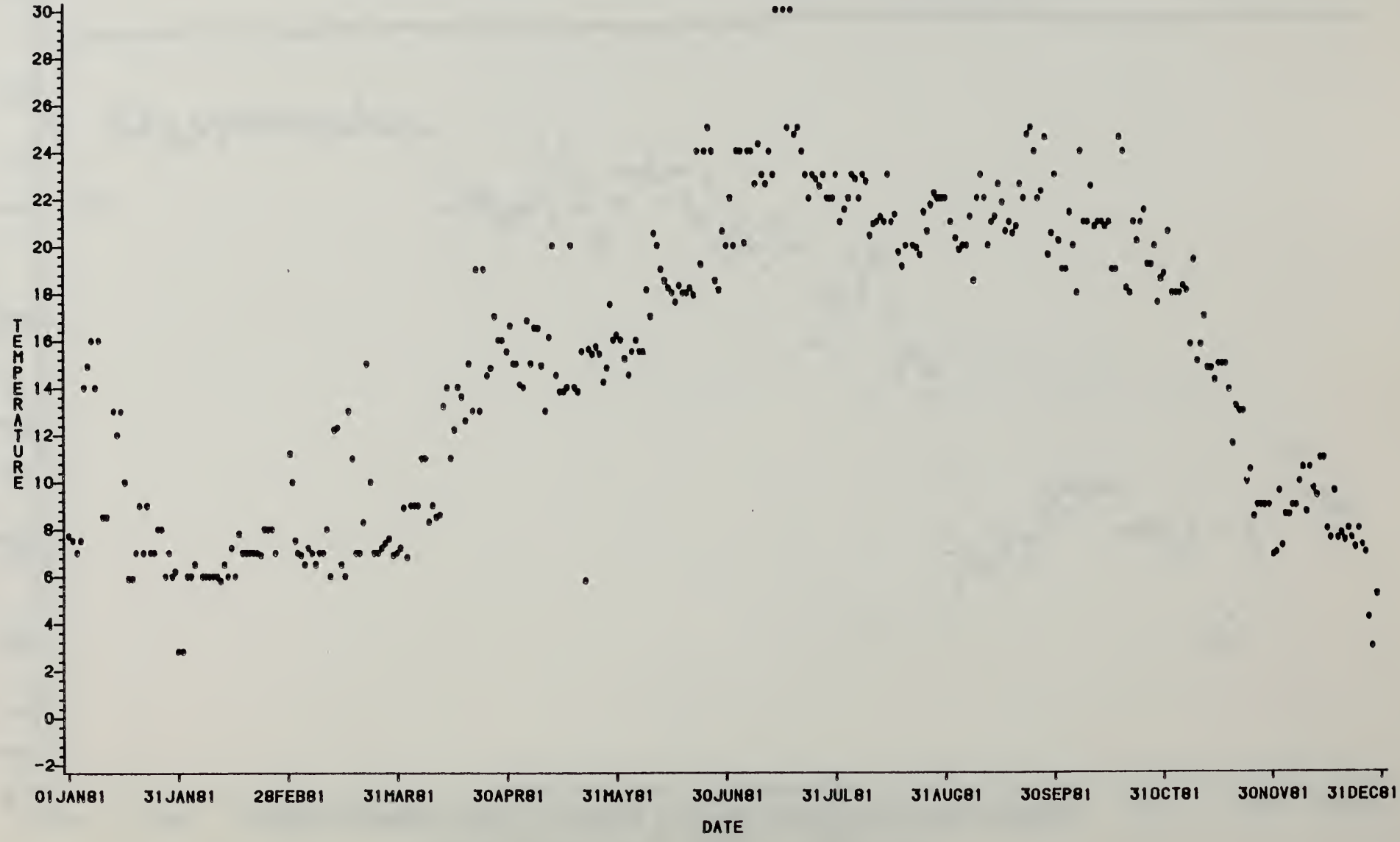
RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM

REPORT YEAR=1981 STATION=YERPOND



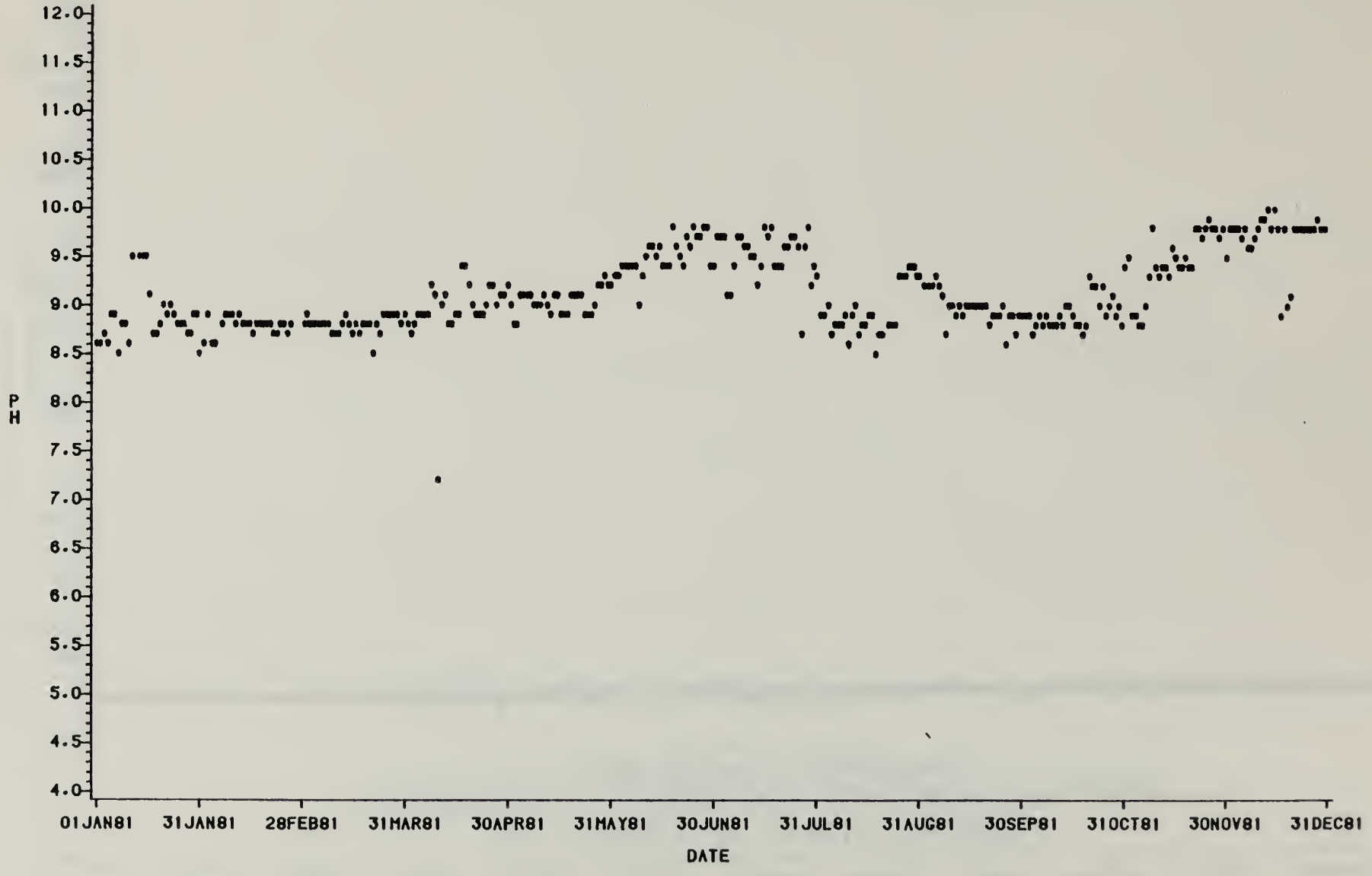
RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM

REPORT YEAR=1981 TYPE=DAMS STATION=YERPOND PARAMETER=TEMPERATURE

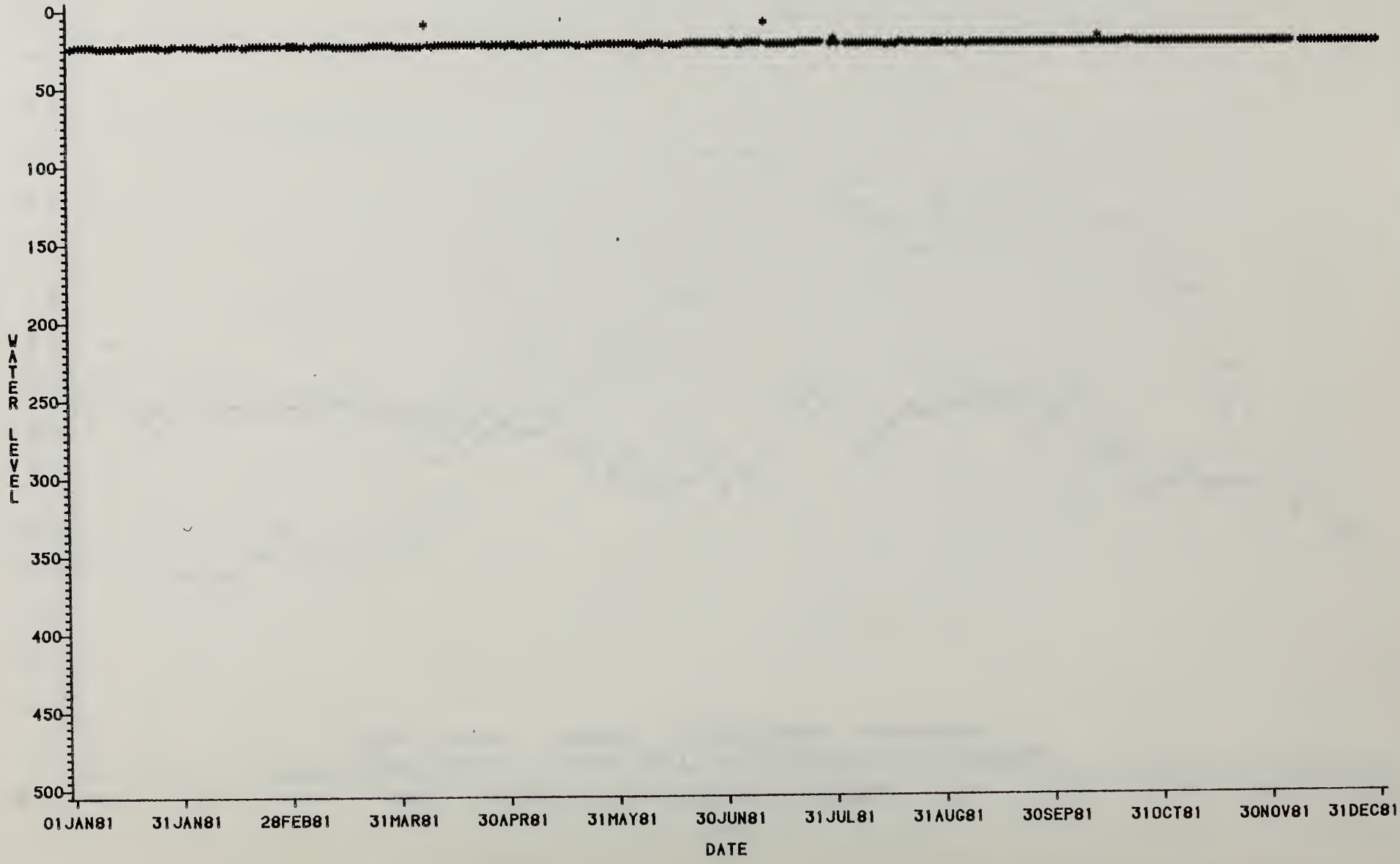


RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM

REPORT YEAR=1981 TYPE=DAMS STATION=YERPOND PARAMETER=PH

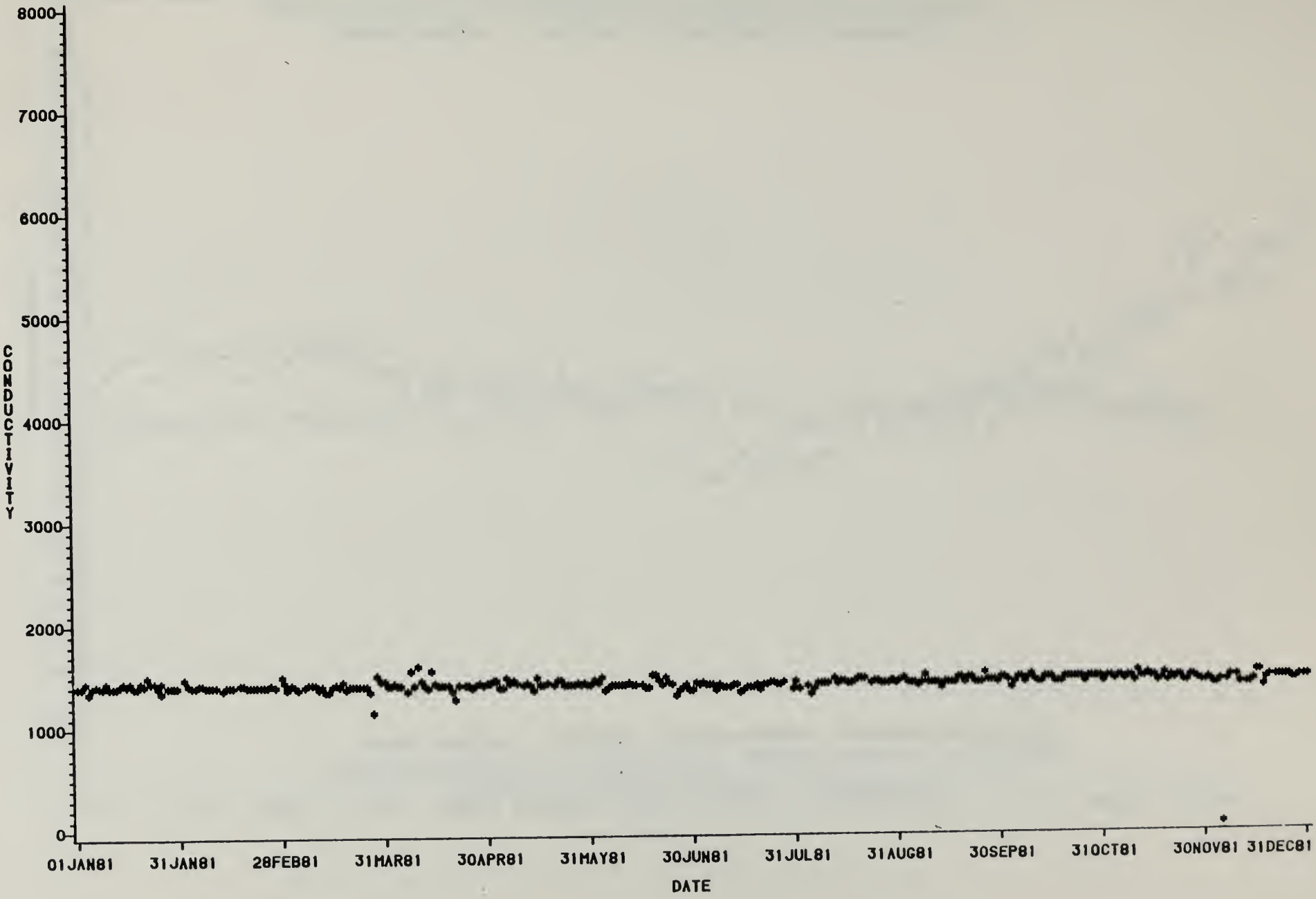


RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM
REPORT YEAR=1981 STATION=YWRPOND



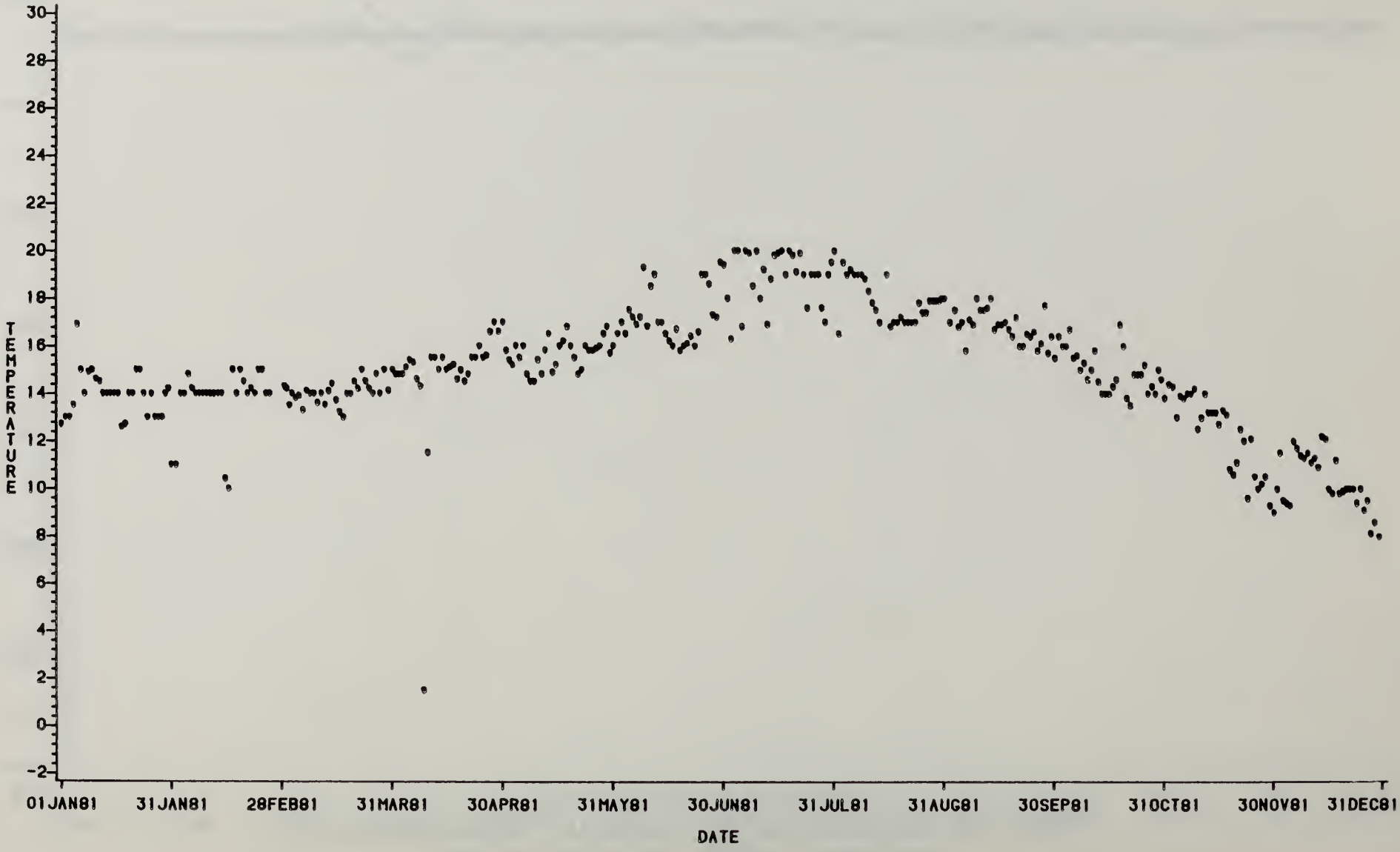
RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM

REPORT YEAR=1981 STATION=YWRPOND



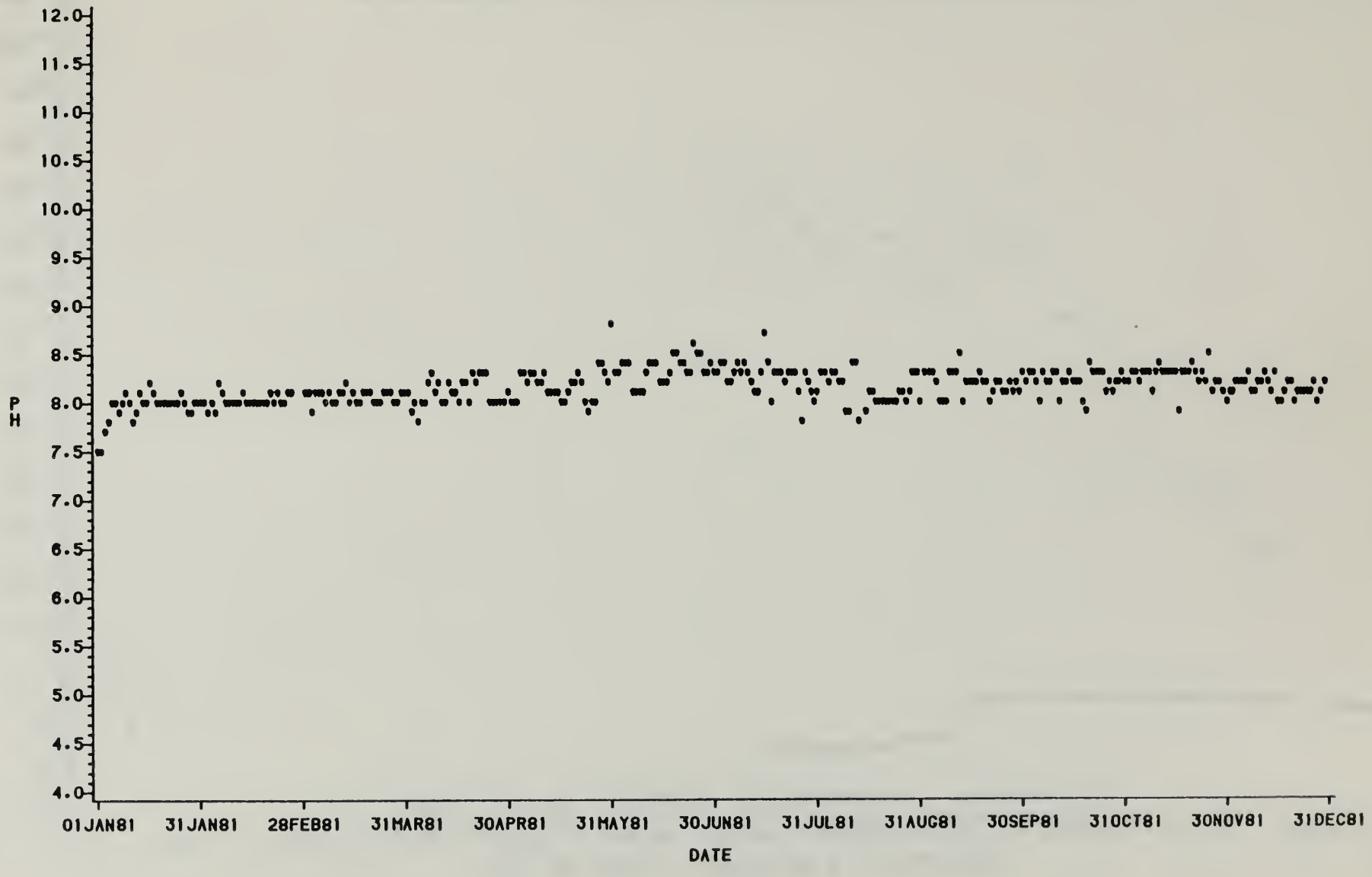
RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM

REPORT YEAR=1981 TYPE=DAMS STATION=YWRPOND PARAMETER=TEMPERATURE



RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM

REPORT YEAR=1981 TYPE=DAMS STATION=YWRPOND PARAMETER=PH

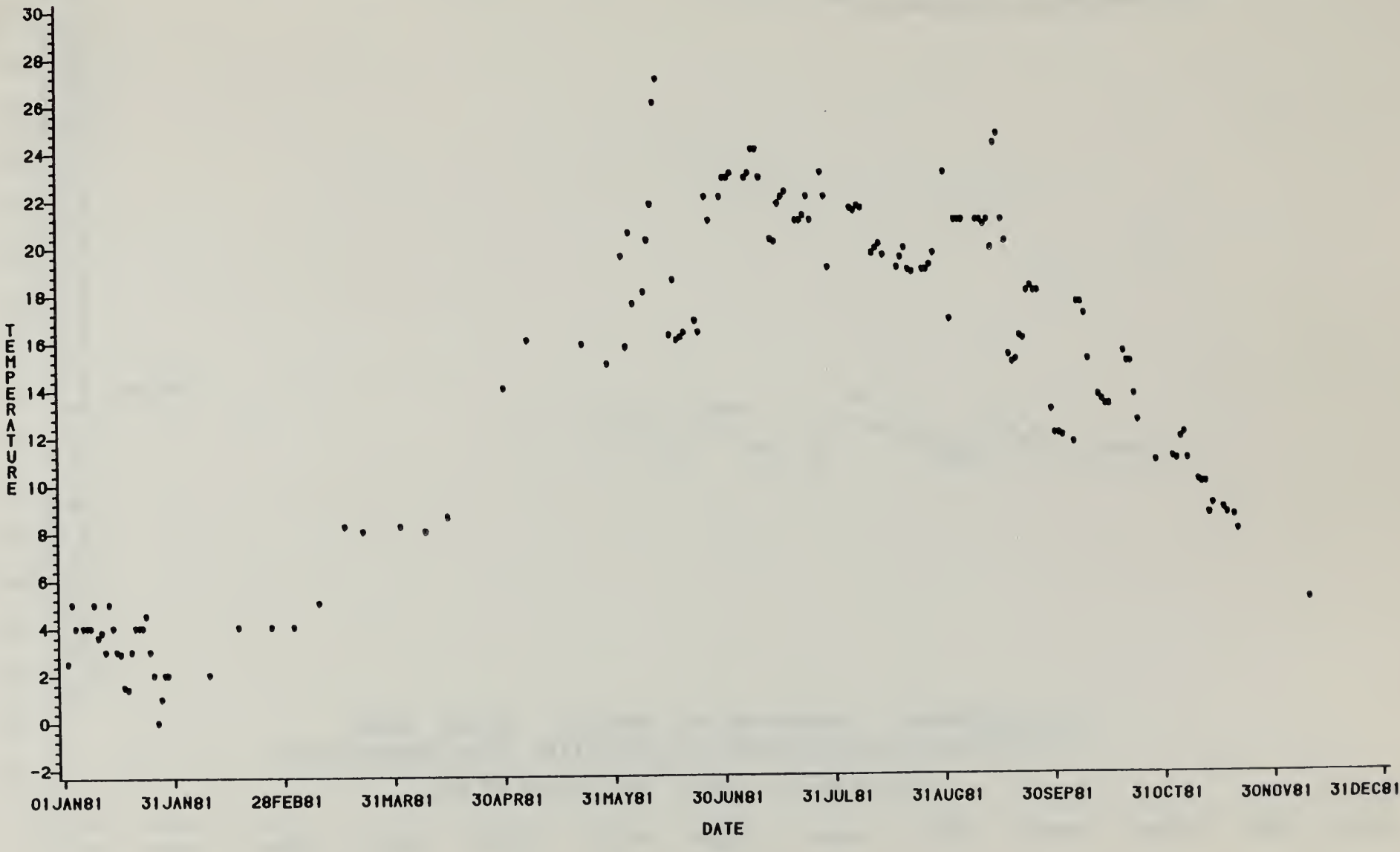


RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM

REPORT YEAR=1981 TYPE=DAMS STATION=YSWPOND-1 PARAMETER=DEPTH

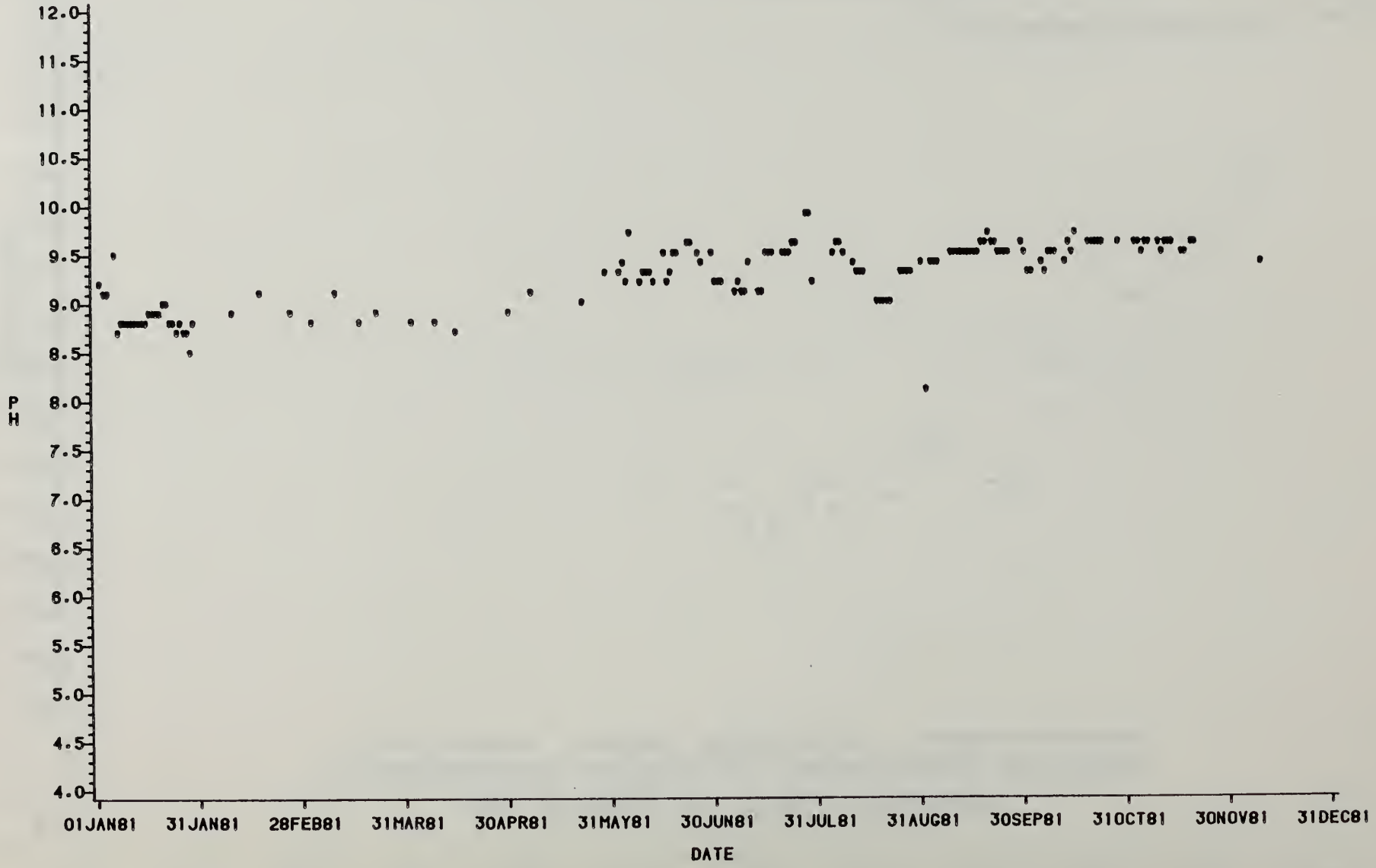
RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM

REPORT YEAR=1981 TYPE=DAMS STATION=YSWPOND-1 PARAMETER=TEMPERATURE



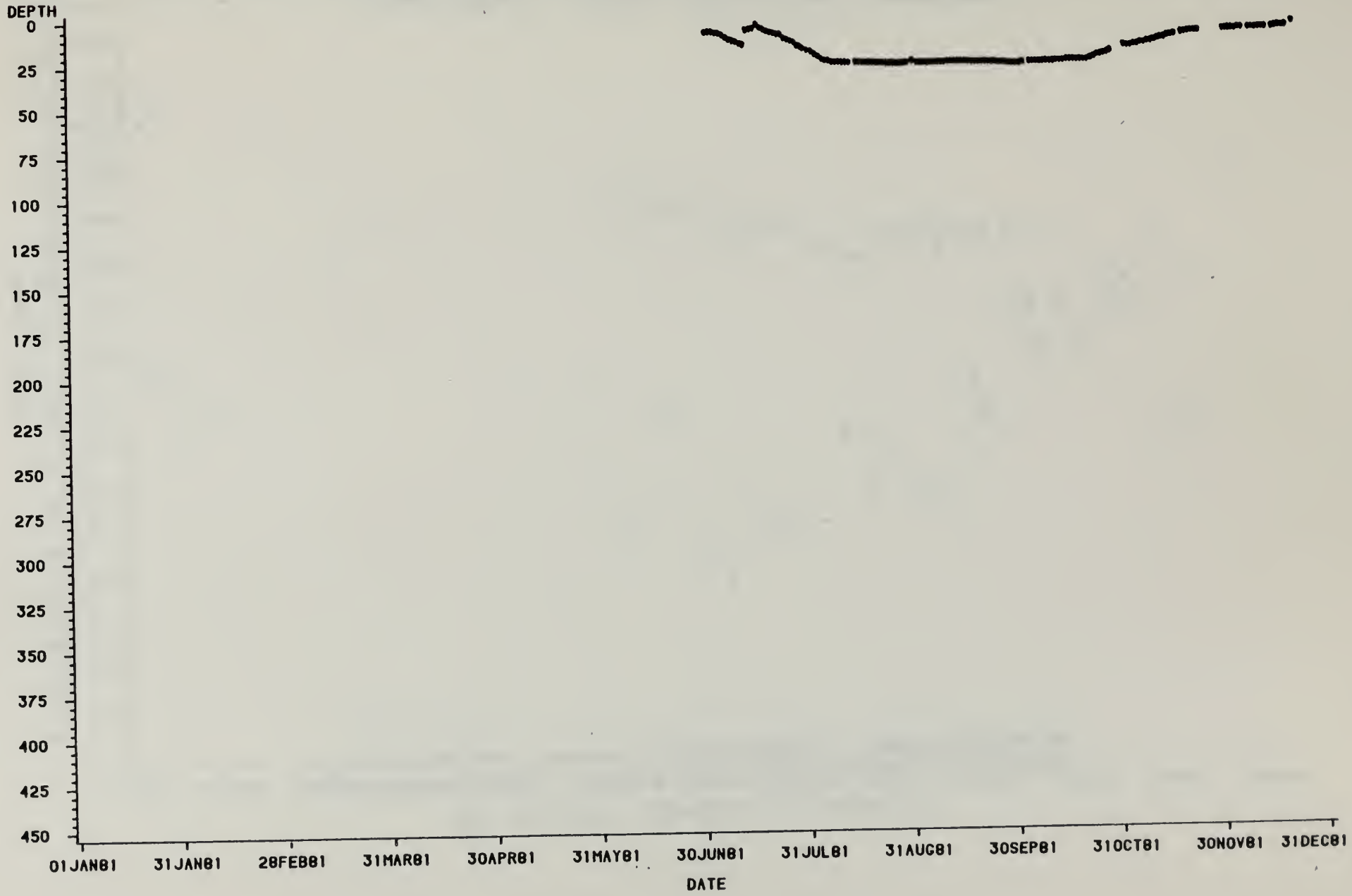
RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM

REPORT YEAR=1981 TYPE=DAMS STATION=YSWPOND-1 PARAMETER=PH



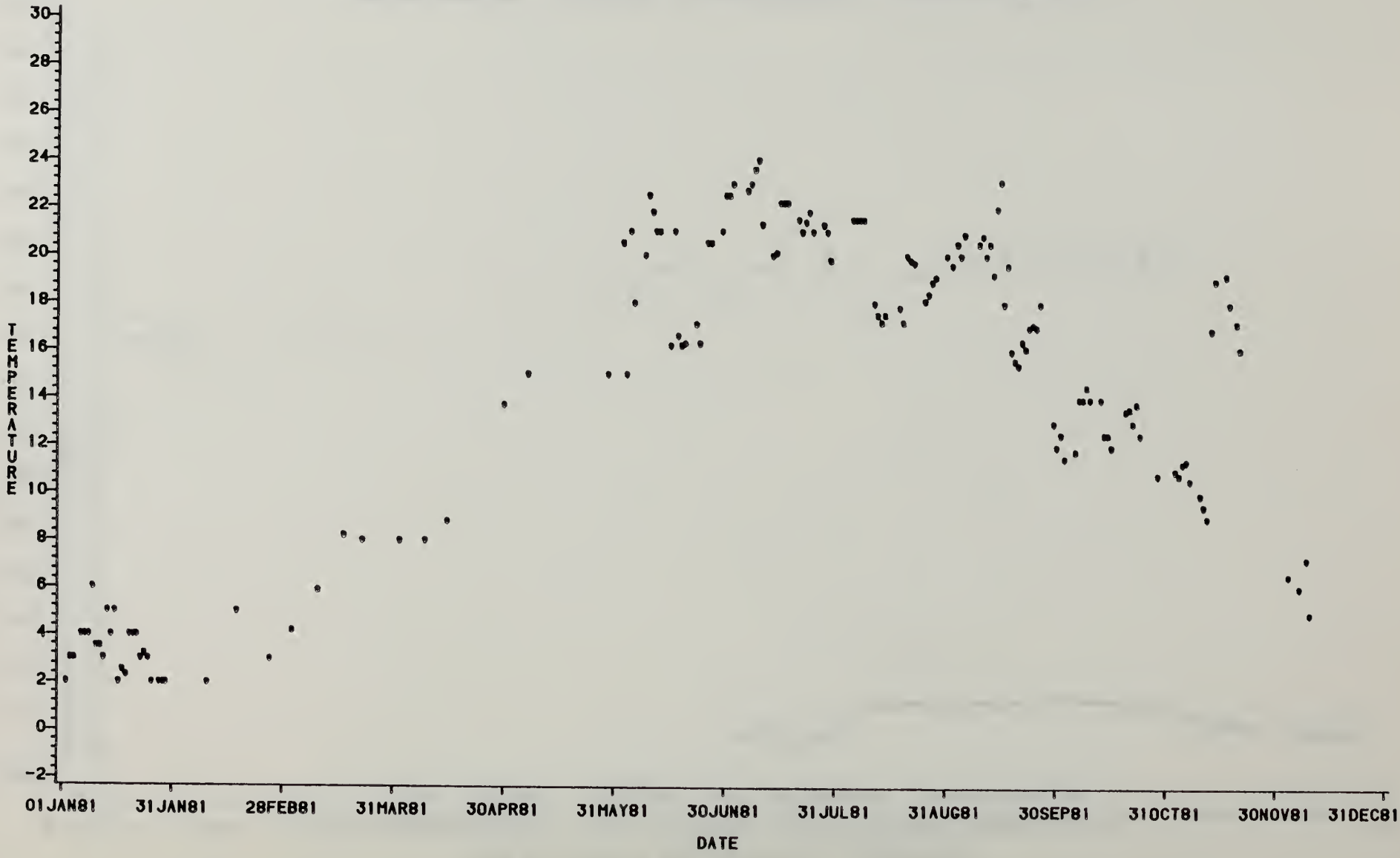
RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM

REPORT YEAR=1981 TYPE=DAMS STATION=YSWPOND-2 PARAMETER=DEPTH



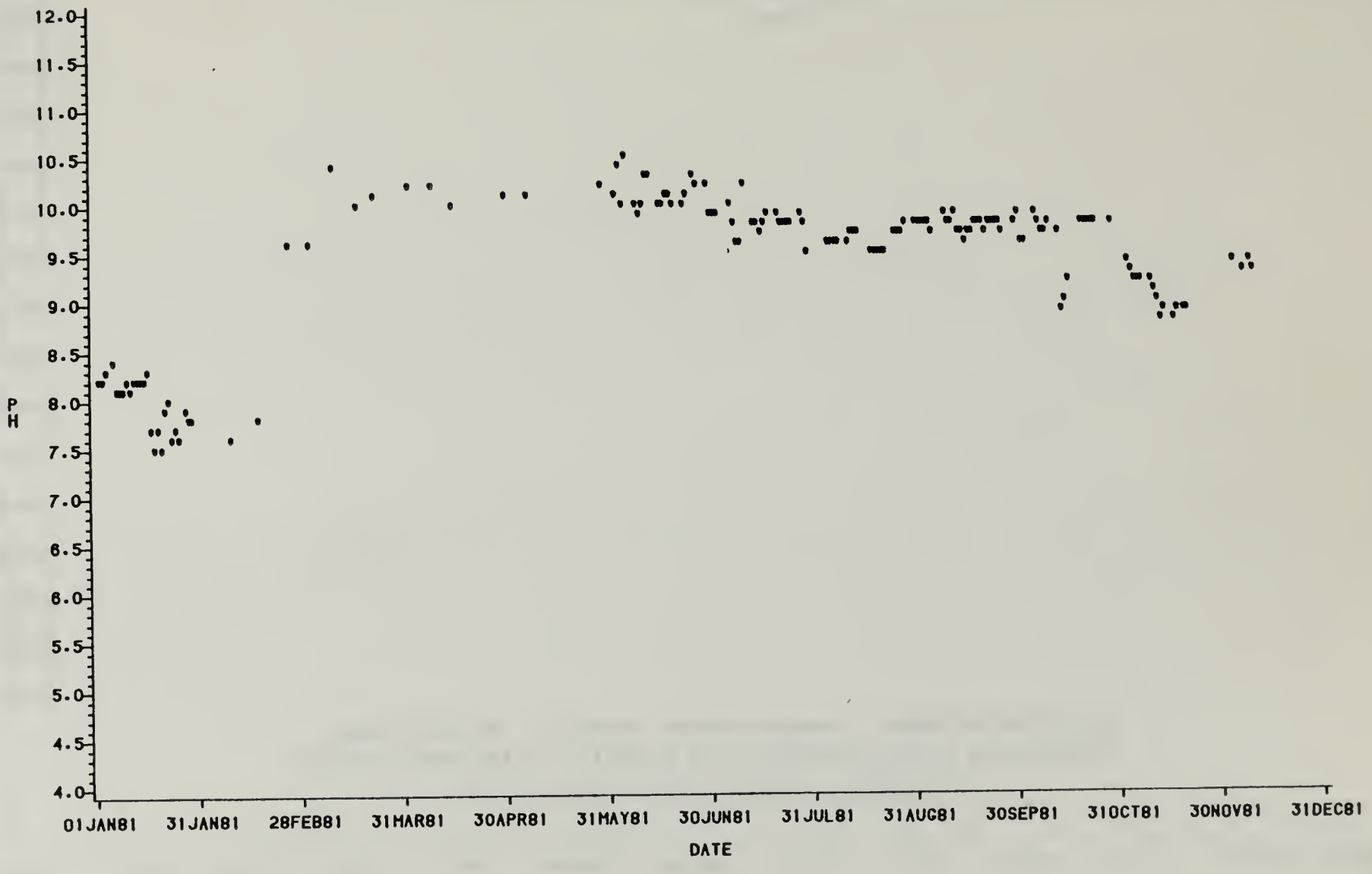
RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM

REPORT YEAR=1981 TYPE=DAMS STATION=YSWPOND-2 PARAMETER=TEMPERATURE



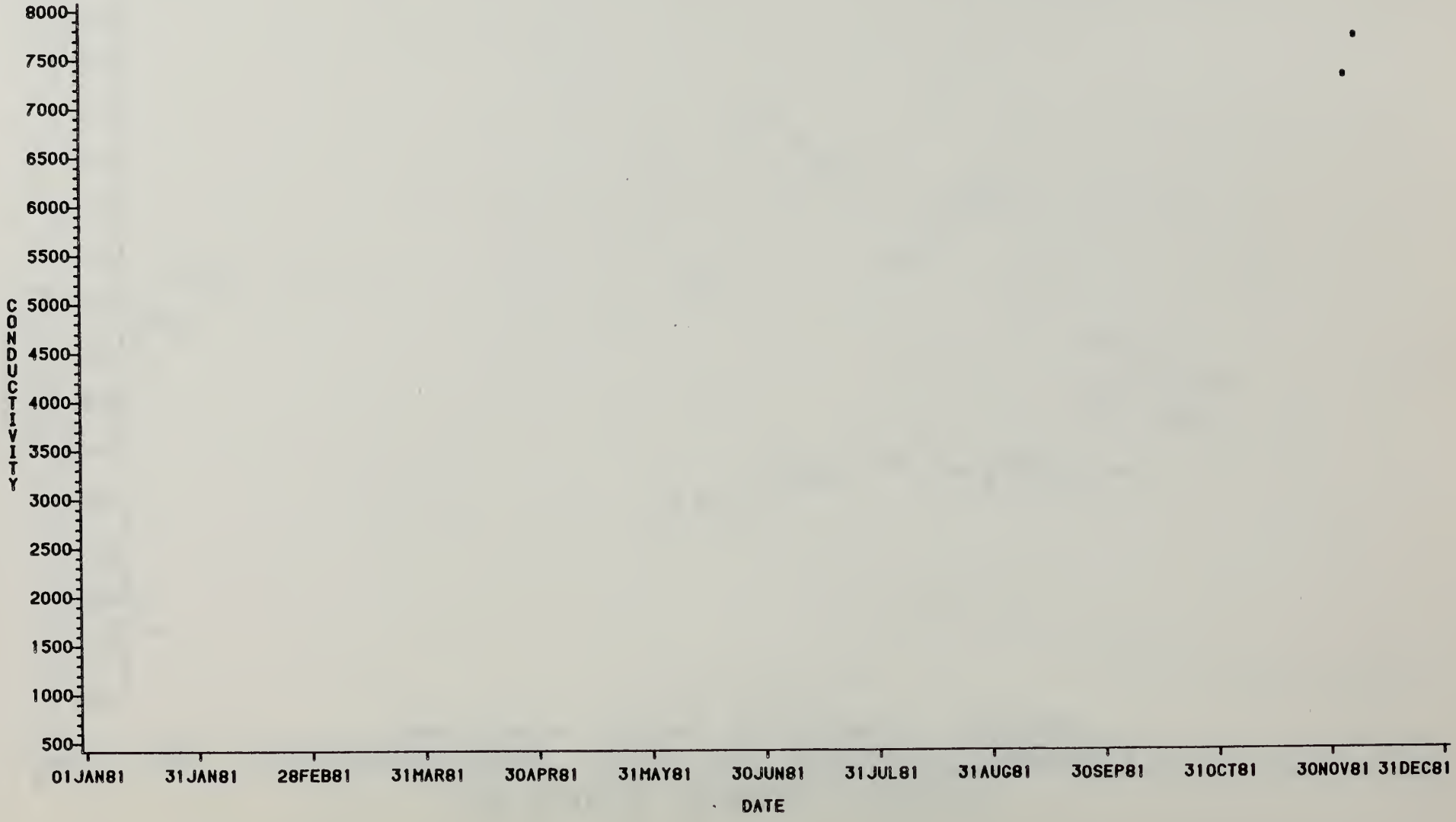
RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM

REPORT YEAR=1981 TYPE=DAMS STATION=YSWPOND-2 PARAMETER=PH



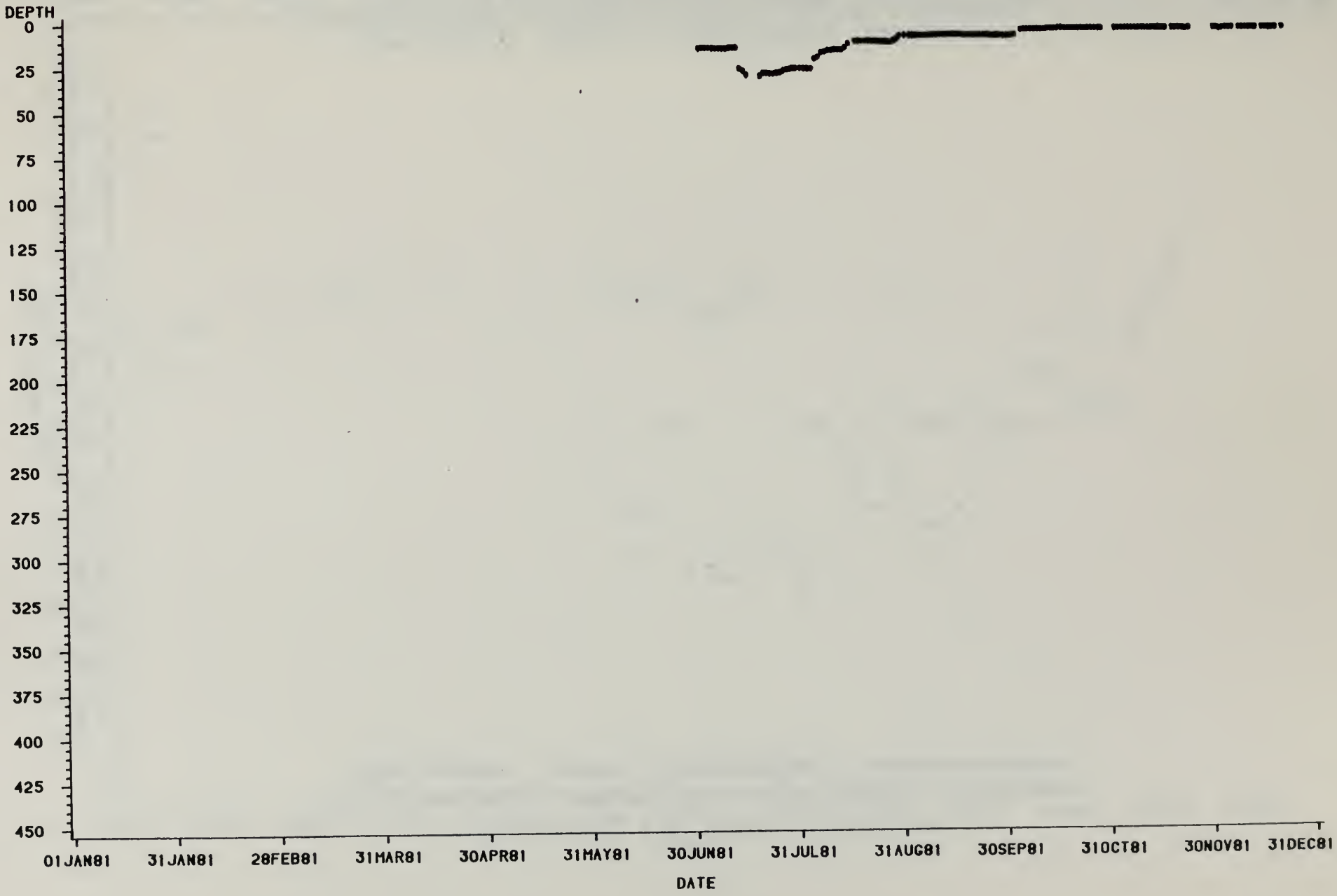
RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM

REPORT YEAR=1981 TYPE=DAMS STATION=YSWPOND-2 PARAMETER=CONDUCTIVITY



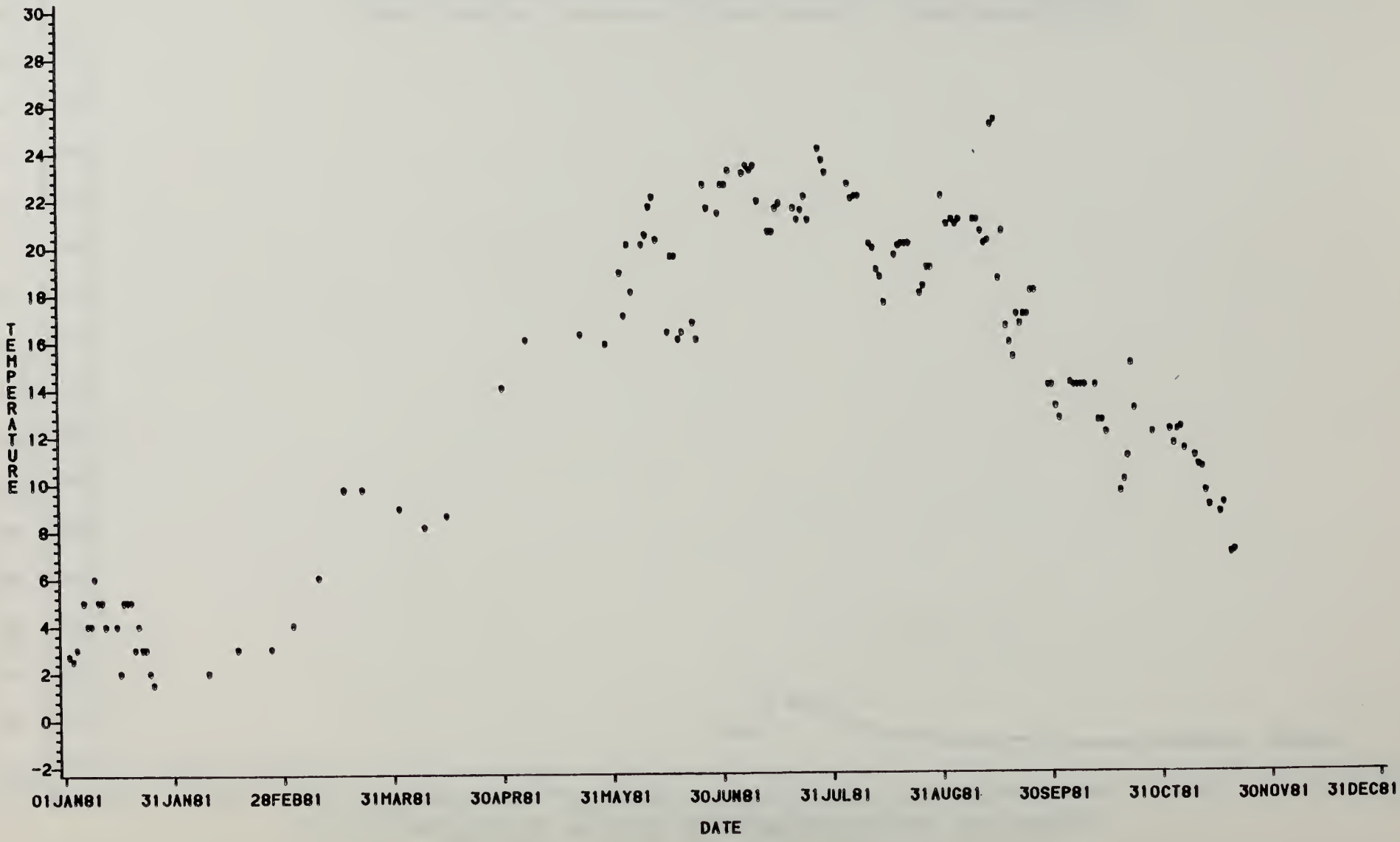
RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM

REPORT YEAR=1981 TYPE=DAMS STATION=YSWPOND-3 PARAMETER=DEPTH



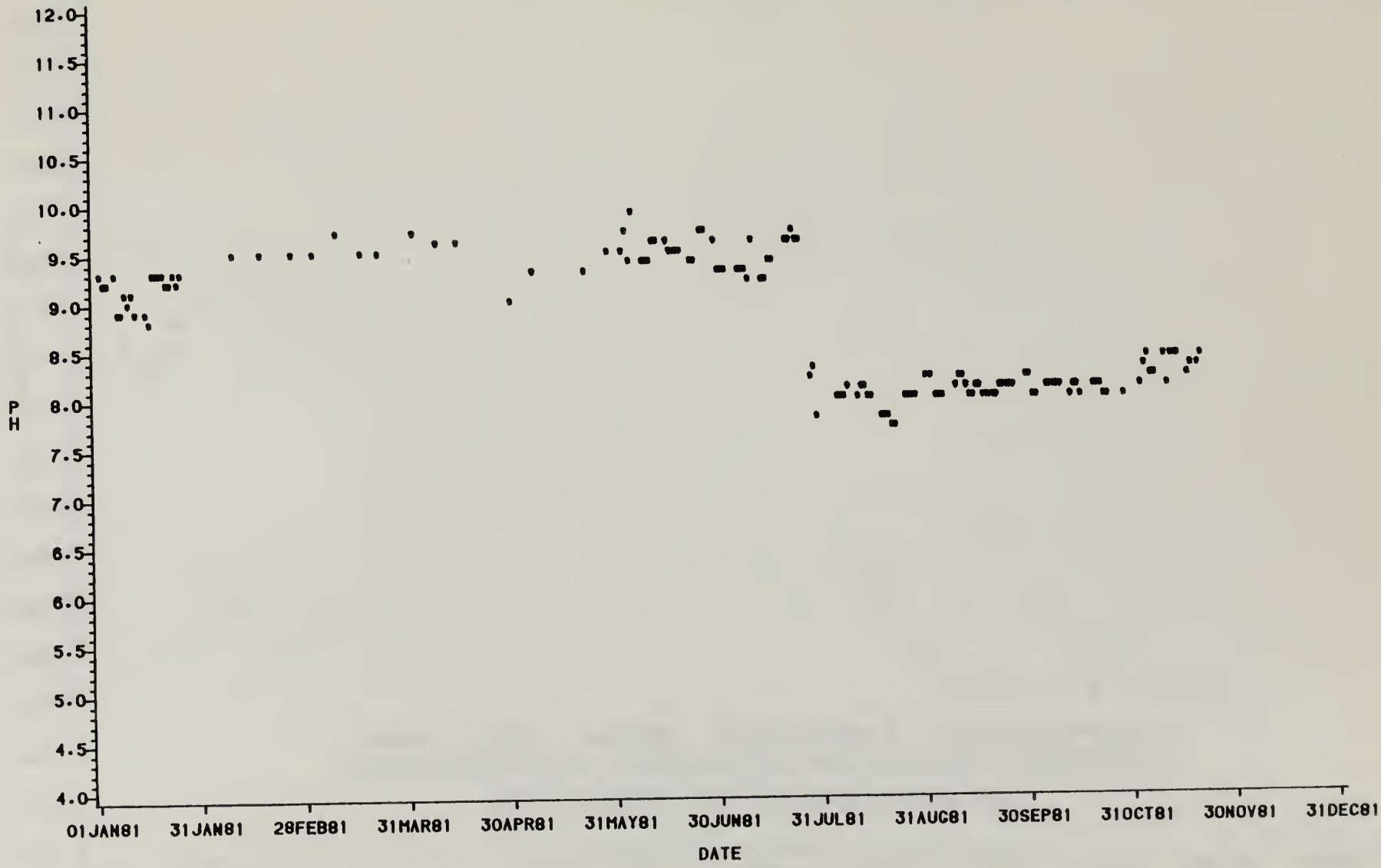
RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM

REPORT YEAR=1981 TYPE=DAMS STATION=YSWPOND-3 PARAMETER=TEMPERATURE



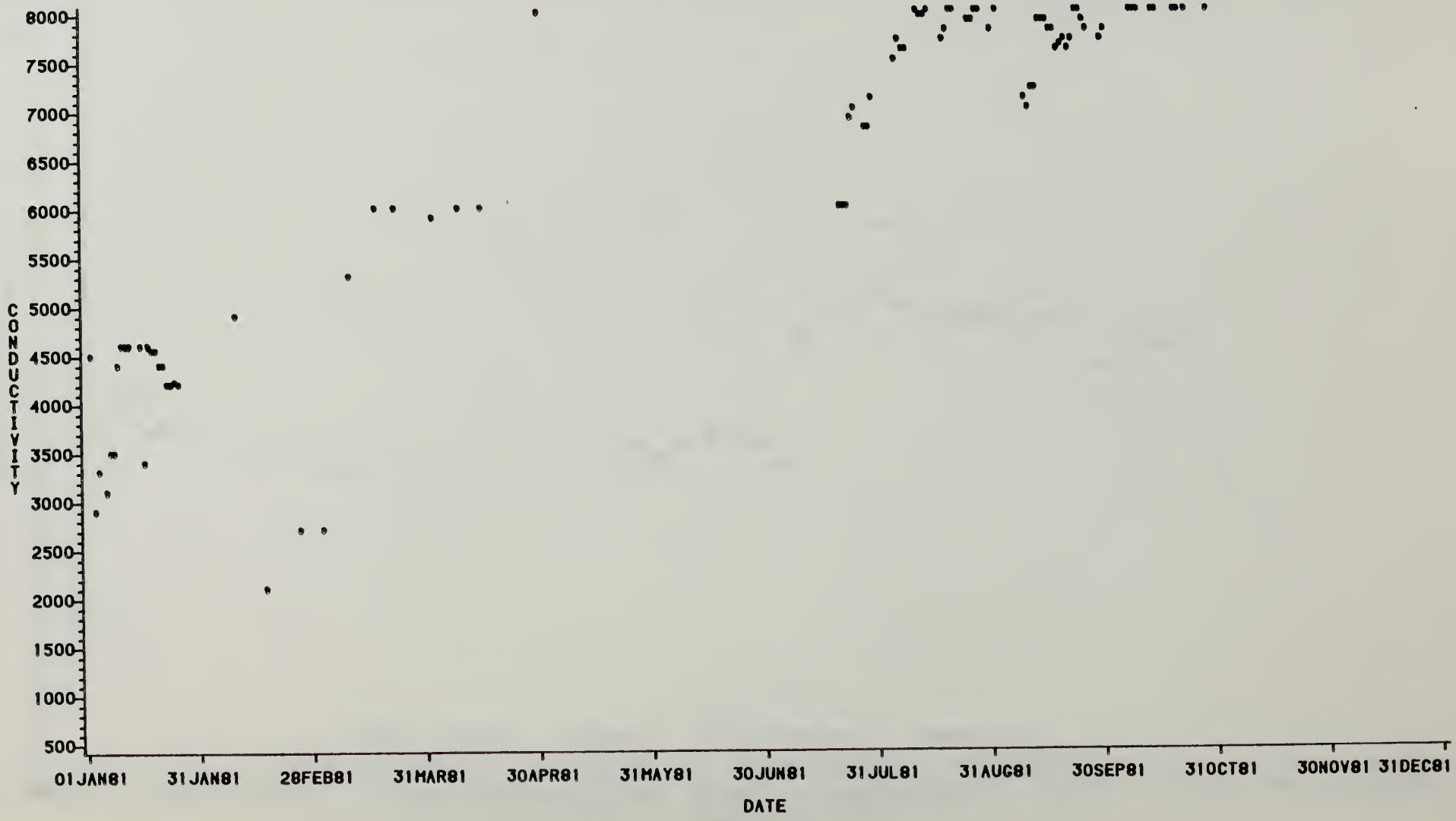
RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM

REPORT YEAR=1981 TYPE=DAMS STATION=YSWPOND-3 PARAMETER=PH



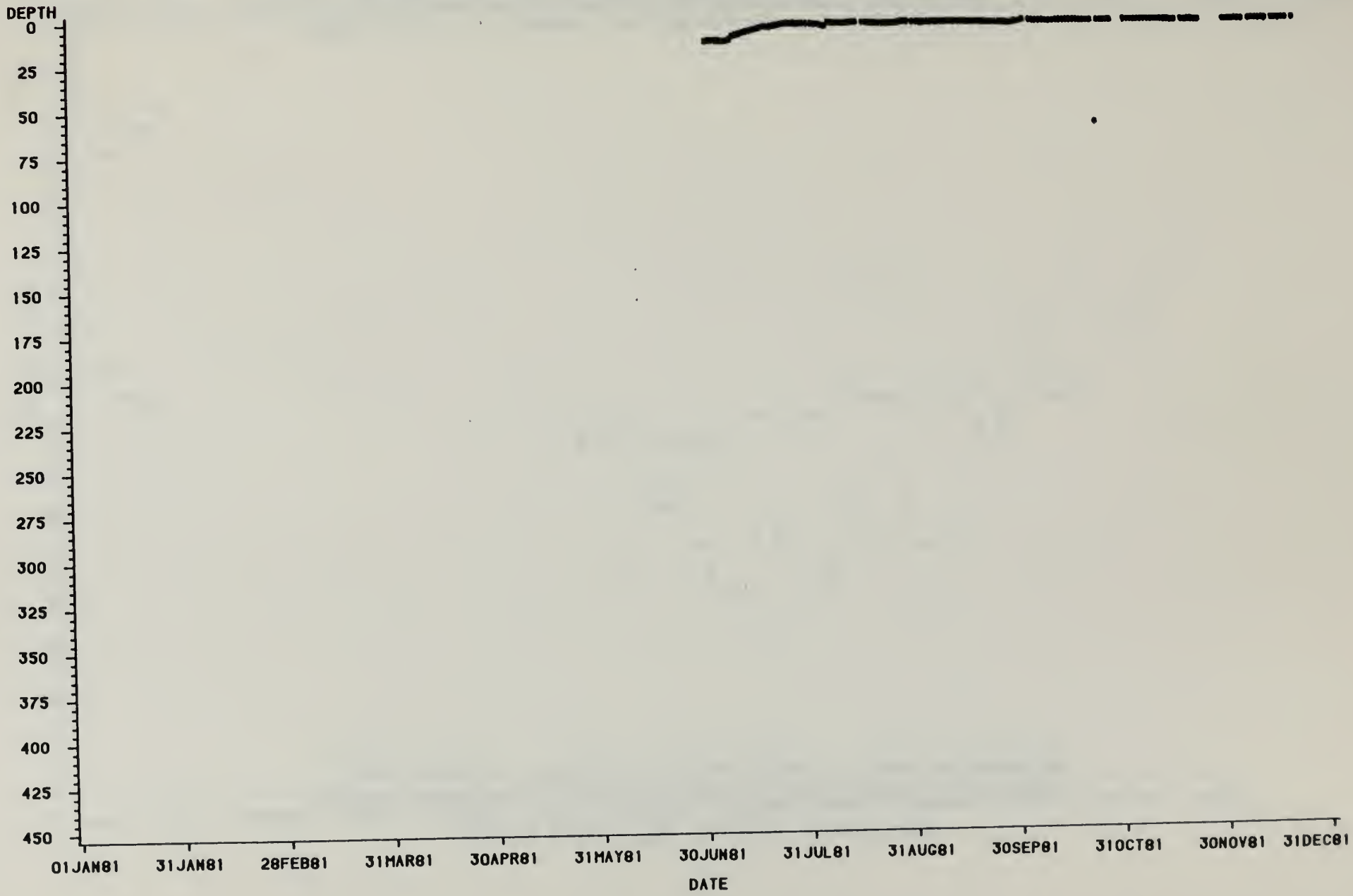
RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM

REPORT YEAR=1981 TYPE=DAMS STATION=YSWPOND-3 PARAMETER=CONDUCTIVITY



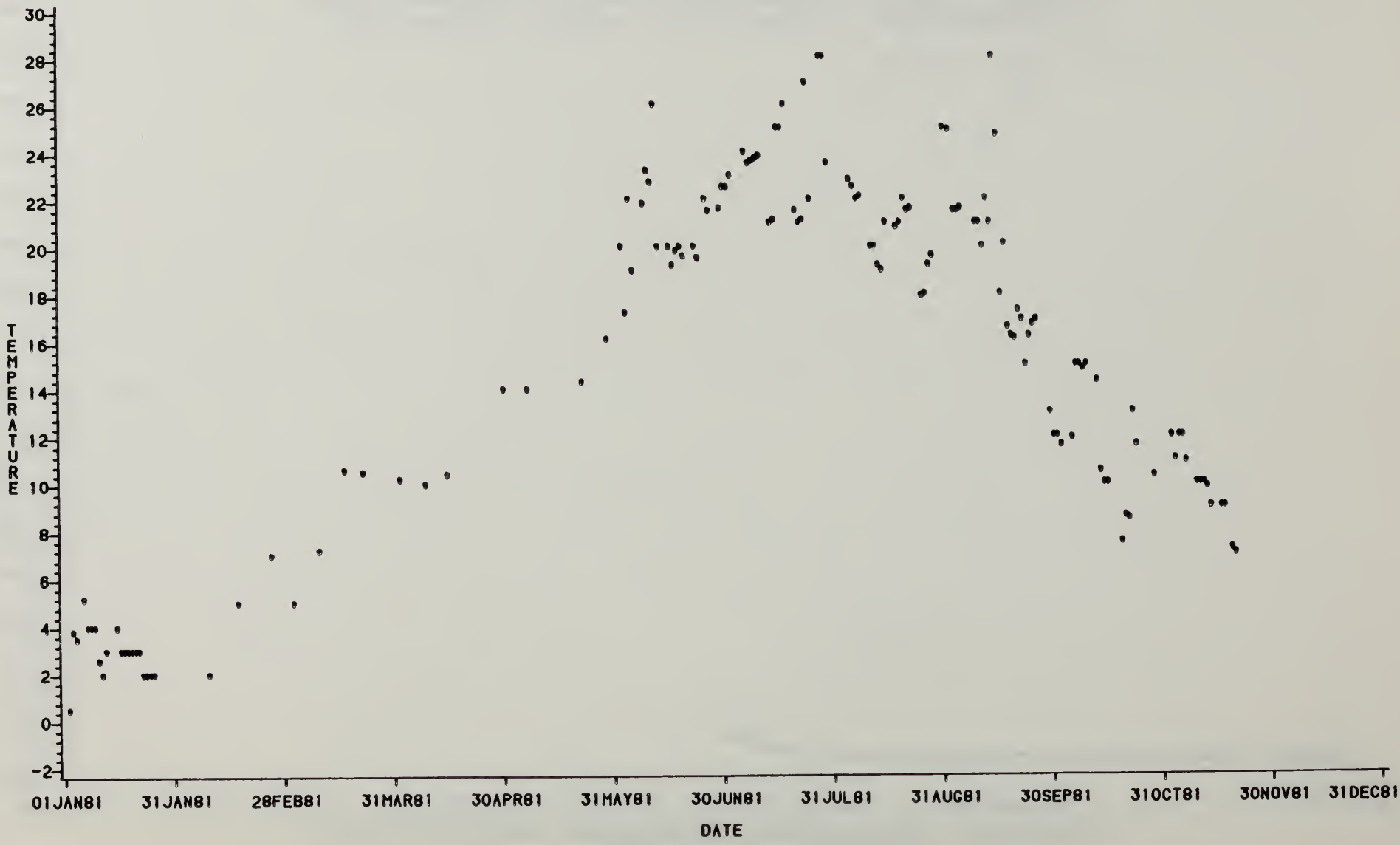
RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM

REPORT YEAR=1981 TYPE=DAMS STATION=YSWPOND-4 PARAMETER=DEPTH



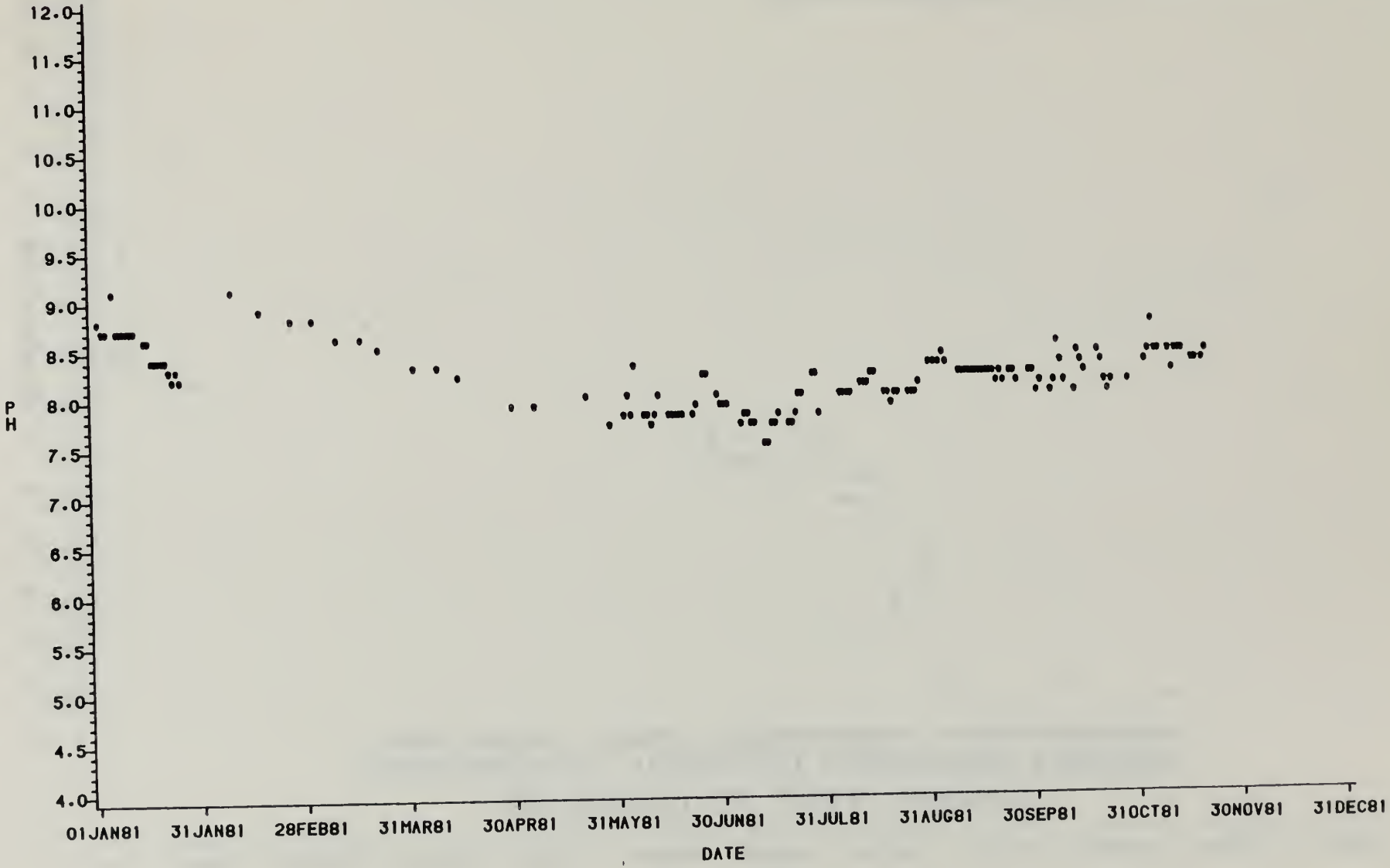
RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM

REPORT YEAR=1981 TYPE=DAMS STATION=YSWPOND-4 PARAMETER=TEMPERATURE



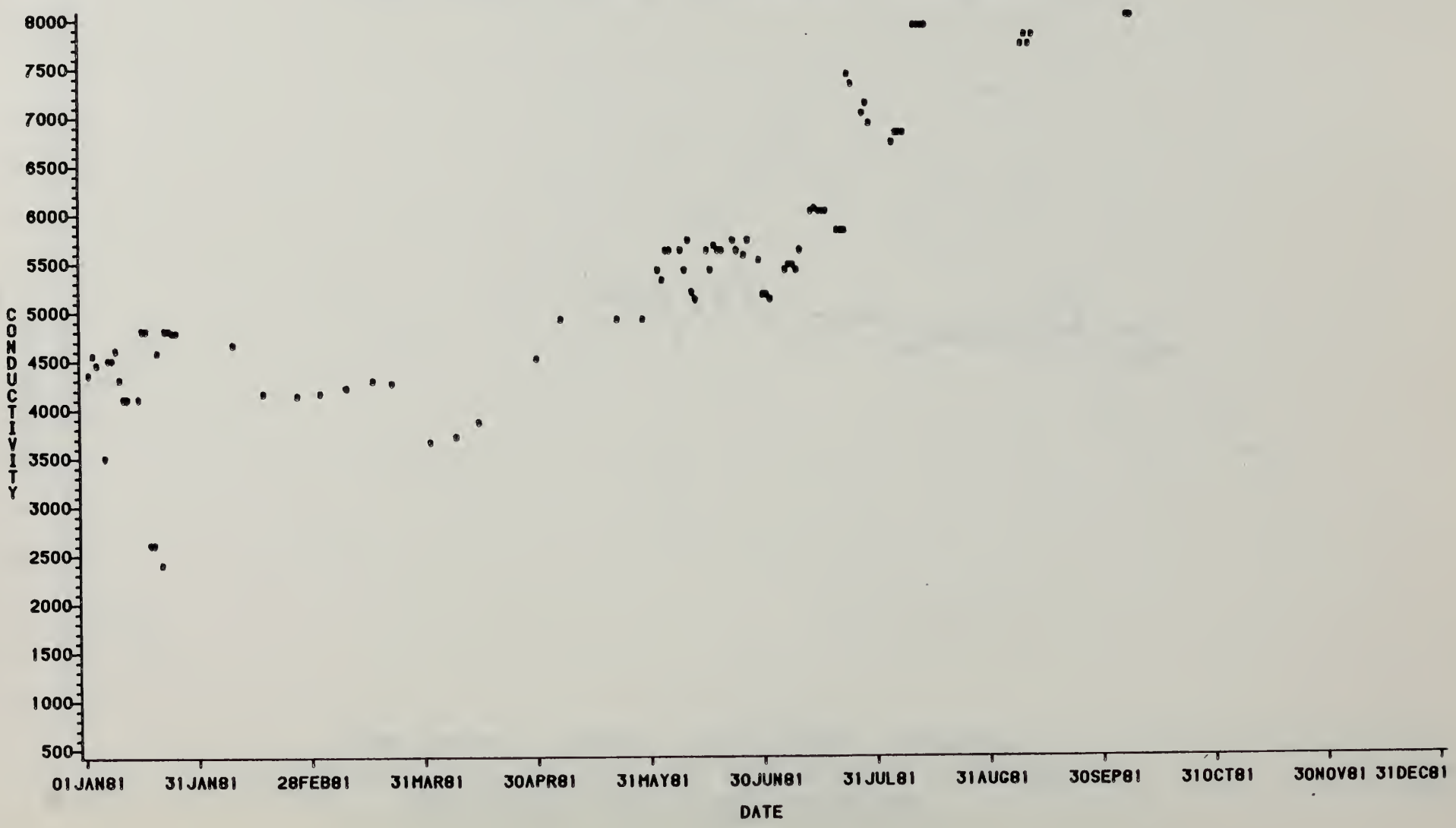
RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM

REPORT YEAR=1981 TYPE=DAMS STATION=YSWPOND-4 PARAMETER=PH



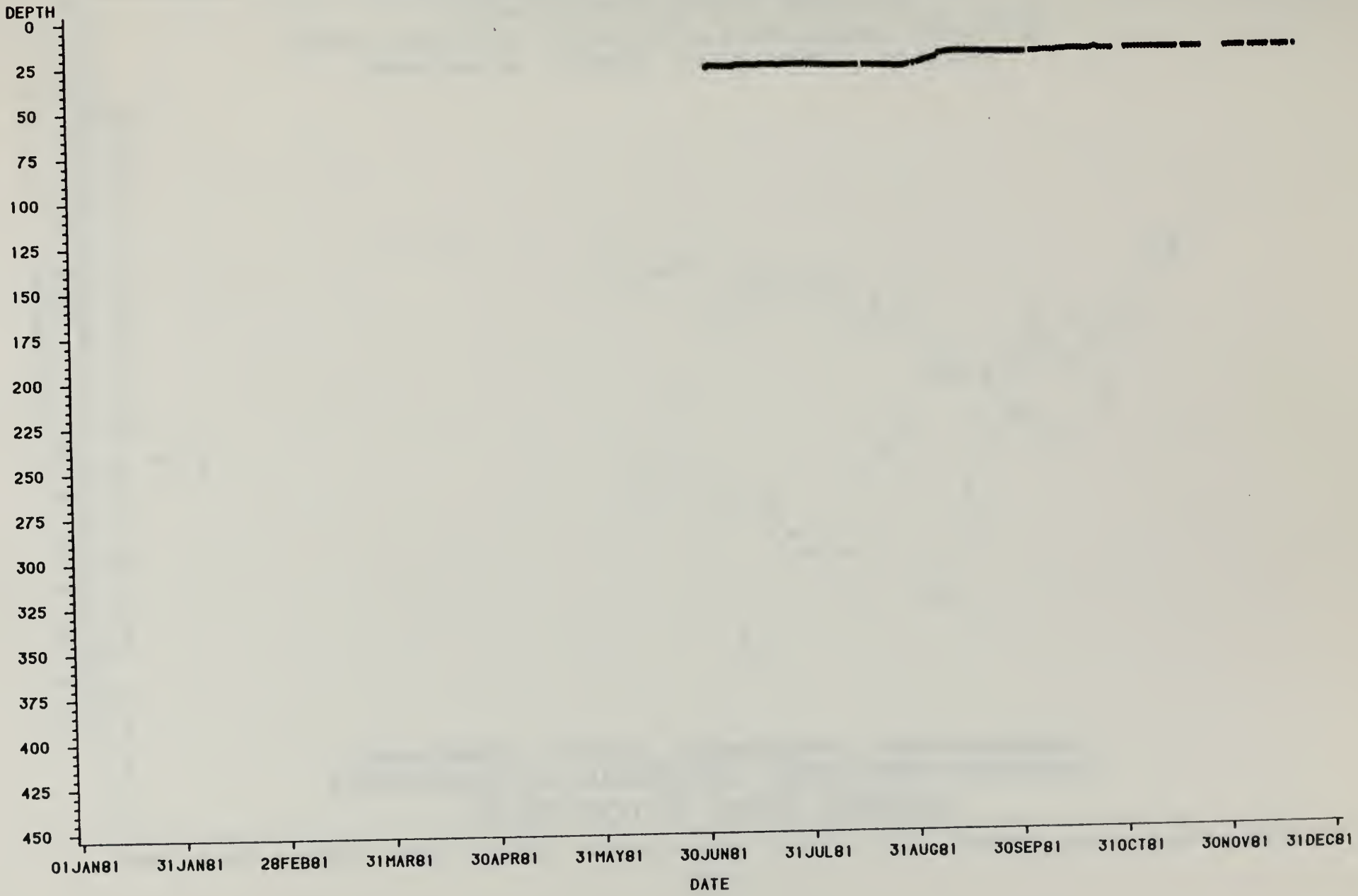
RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM

REPORT YEAR=1981 TYPE=DAMS STATION=YSWPOND-4 PARAMETER=CONDUCTIVITY



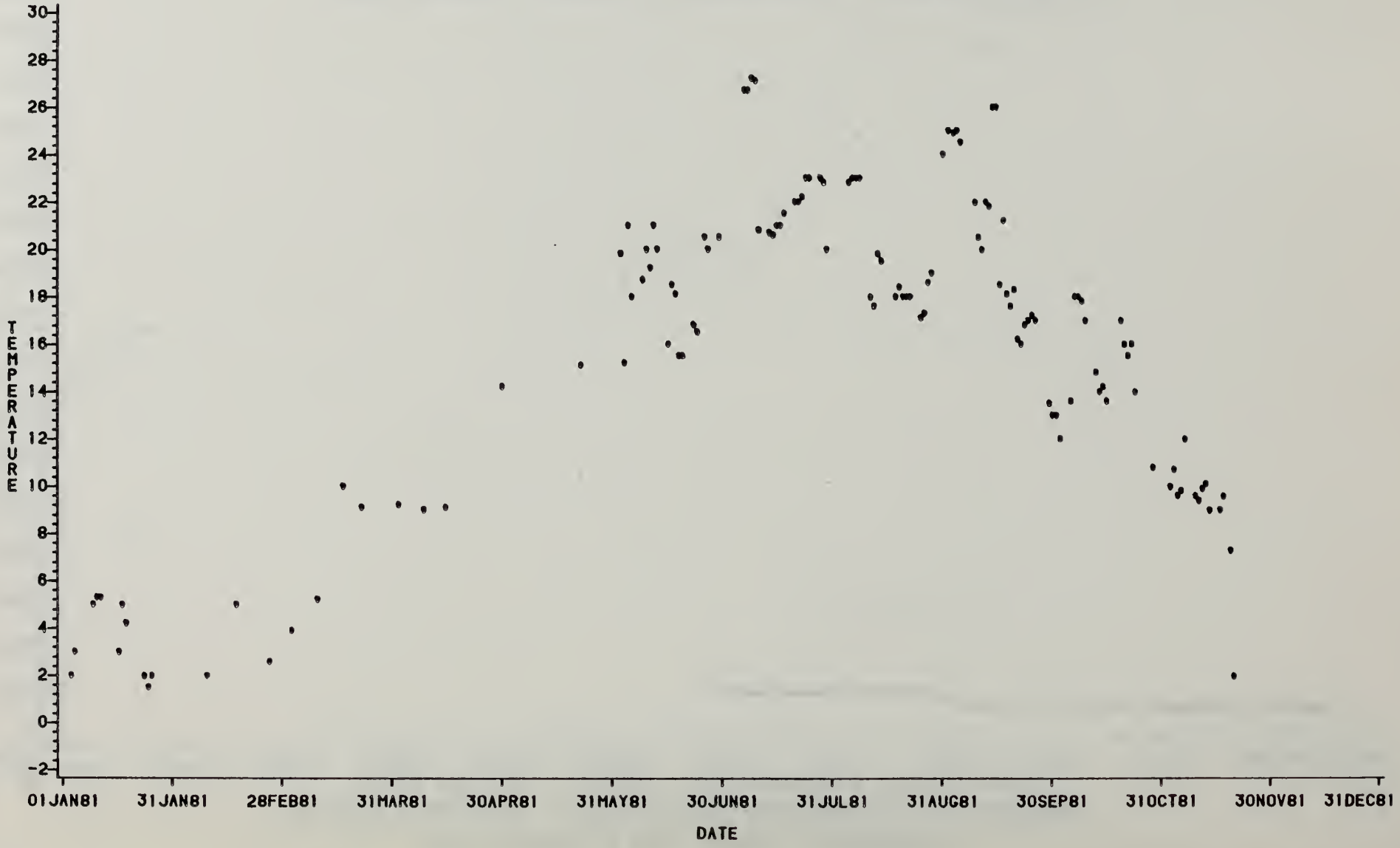
RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM

REPORT YEAR=1981 TYPE=DAMS STATION=YSWPOND-5 PARAMETER=DEPTH

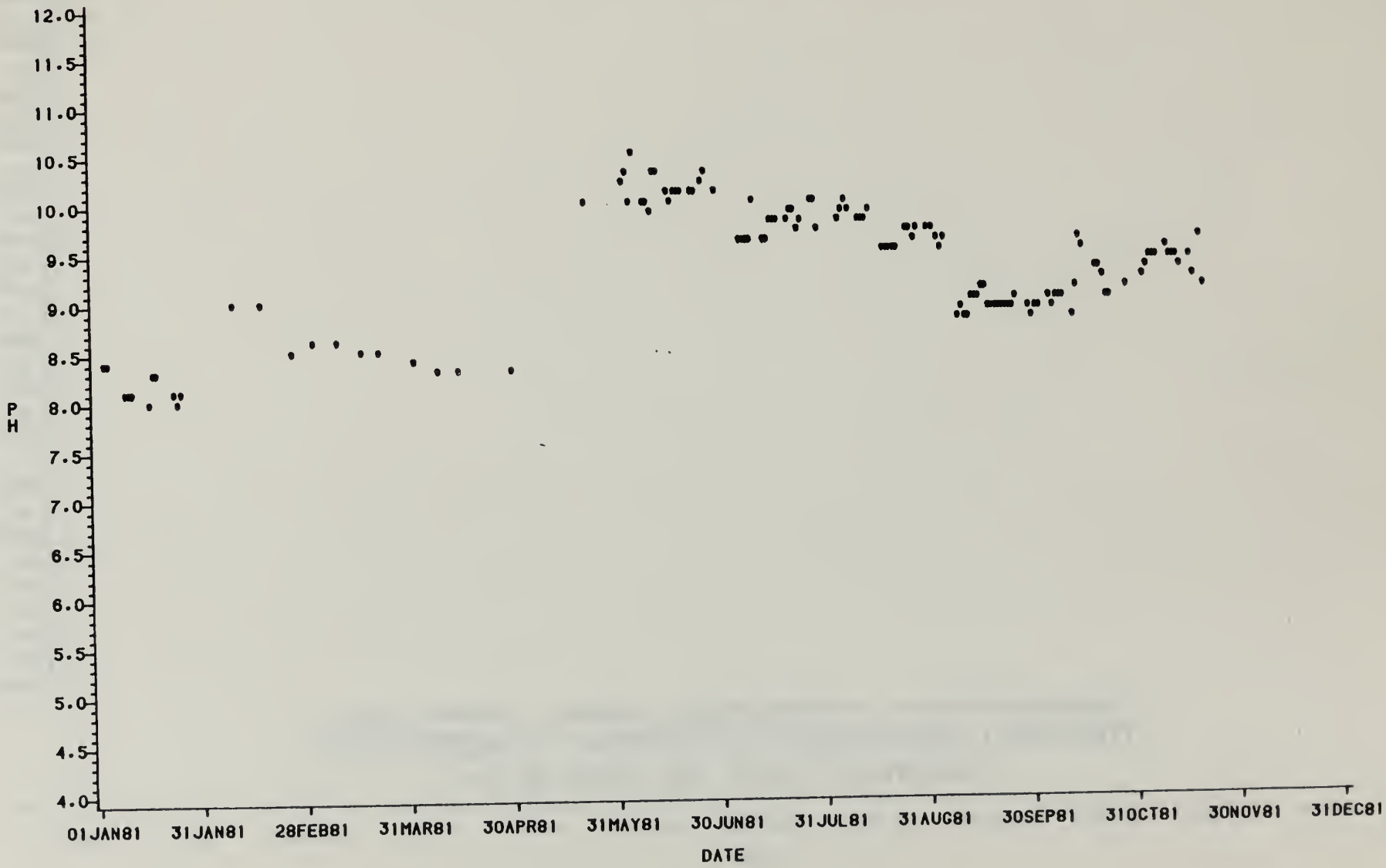


RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM

REPORT YEAR=1981 TYPE=DAMS STATION=YSWPOND-5 PARAMETER=TEMPERATURE

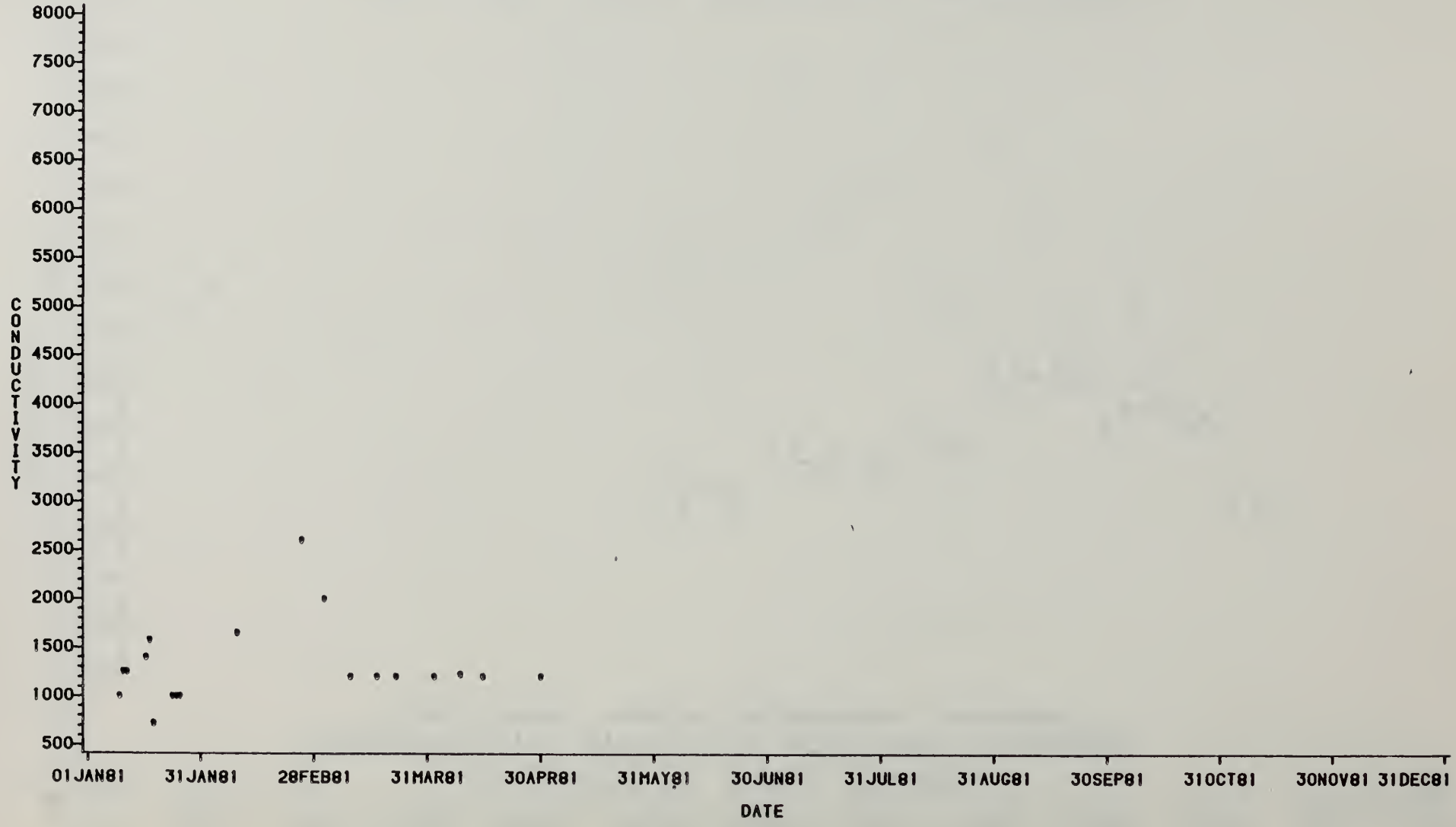


RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM
REPORT YEAR=1981 TYPE=DAMS STATION=YSWPOND-5 PARAMETER=PH



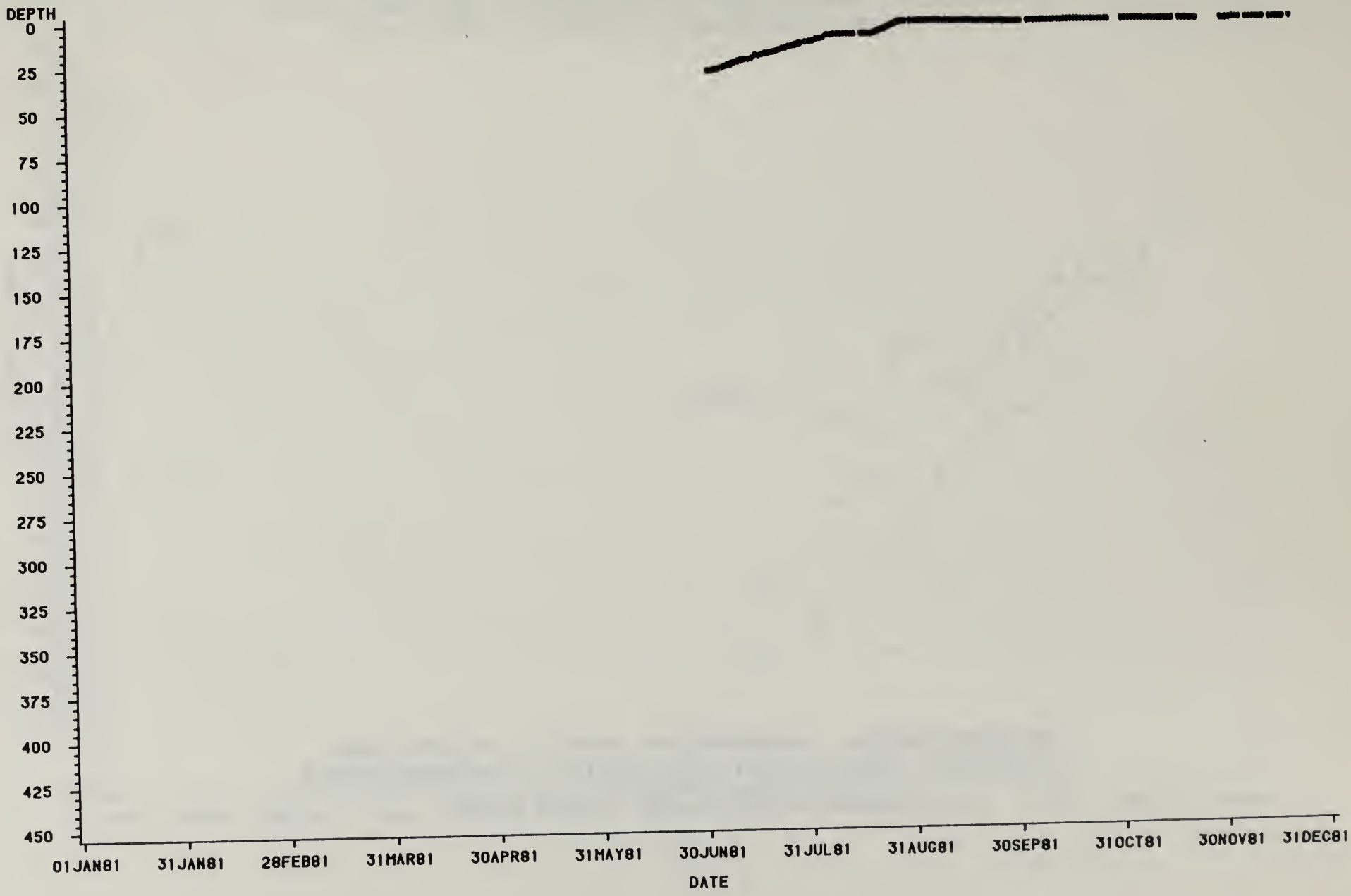
RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM

REPORT YEAR=1981 TYPE=DAMS STATION=YSWPOND-5 PARAMETER=CONDUCTIVITY



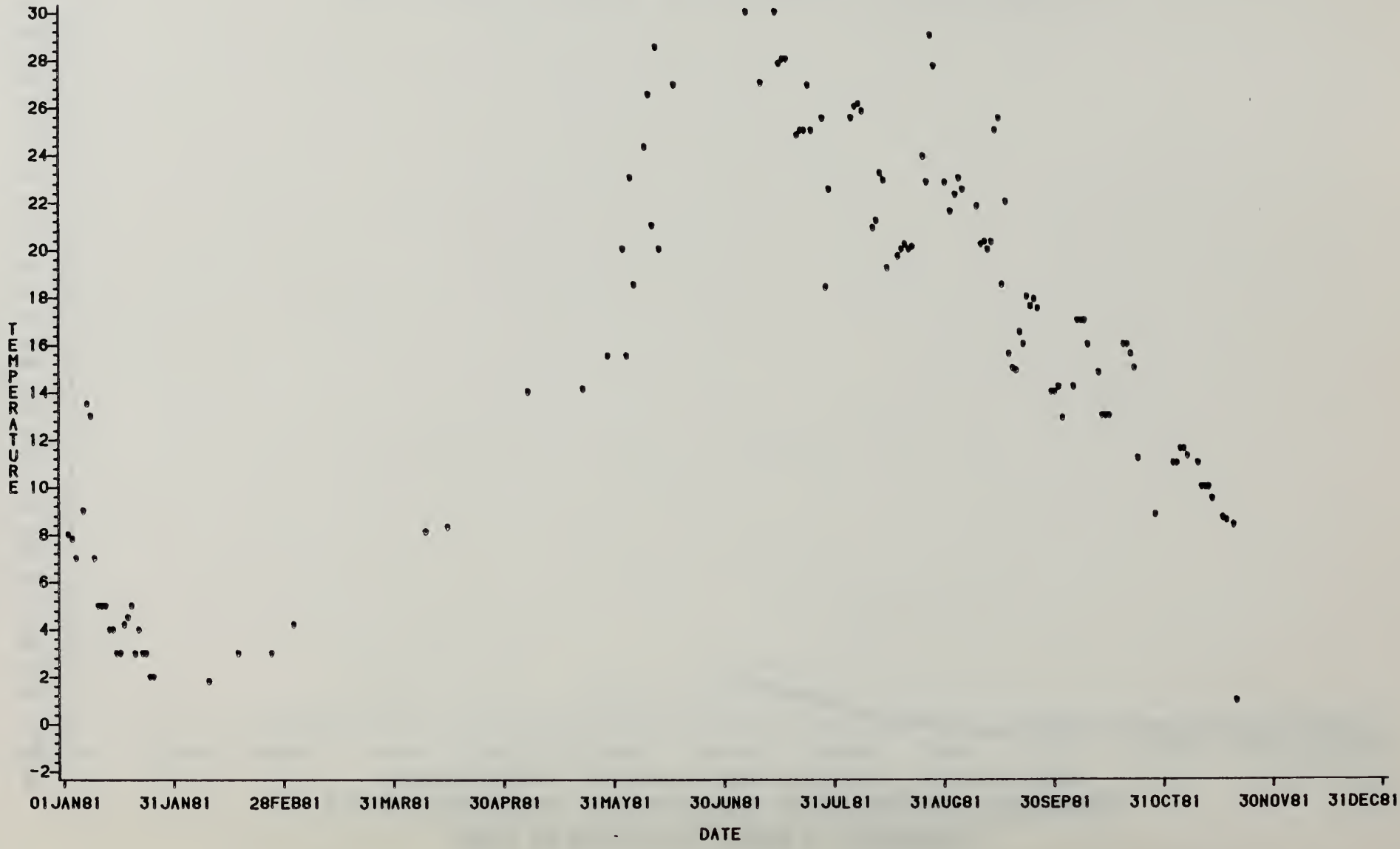
RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM

REPORT YEAR=1981 TYPE=DAMS STATION=YSWPOND-6 PARAMETER=DEPTH



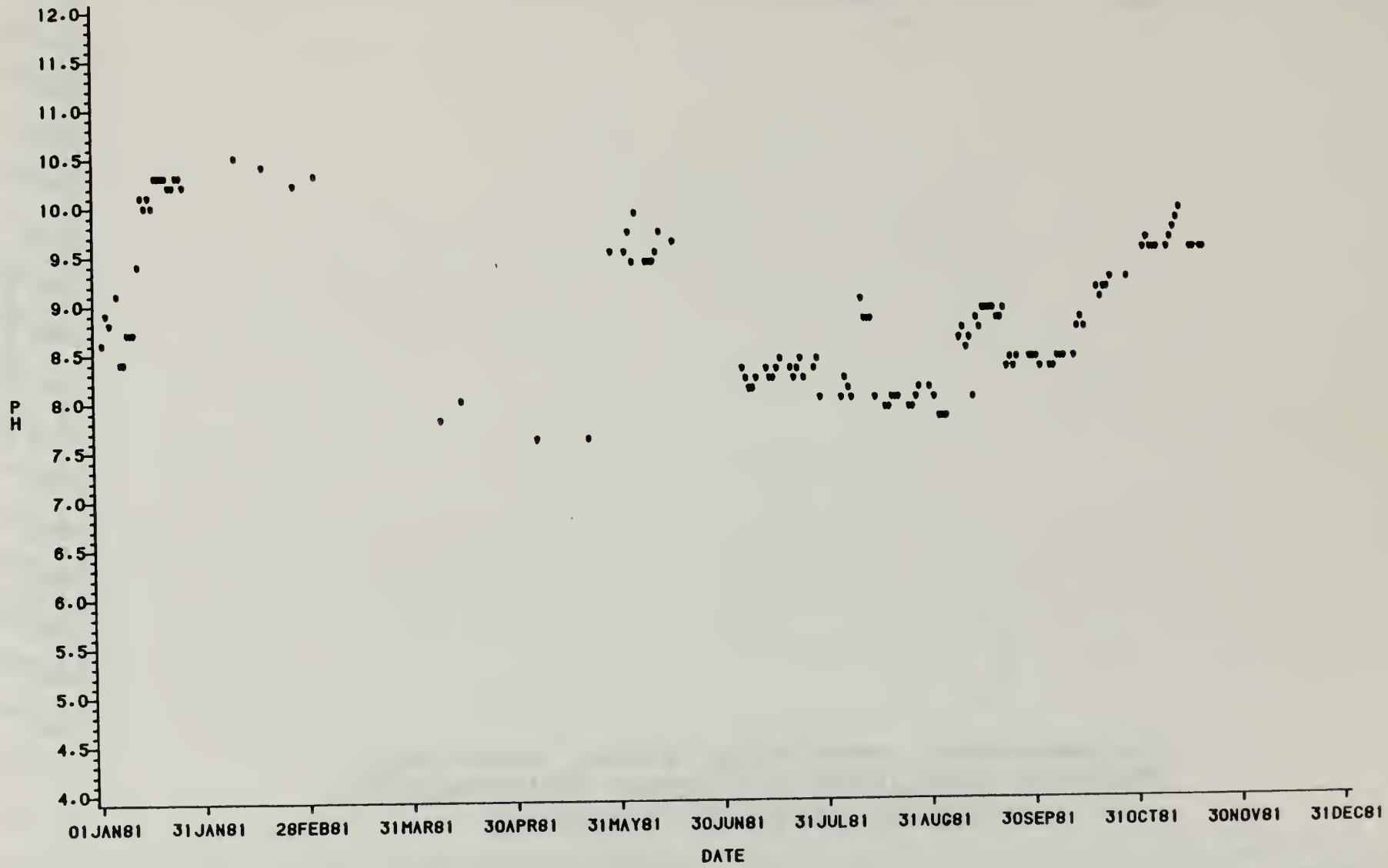
RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM

REPORT YEAR=1981 TYPE=DAMS STATION=YSWPOND-6 PARAMETER=TEMPERATURE



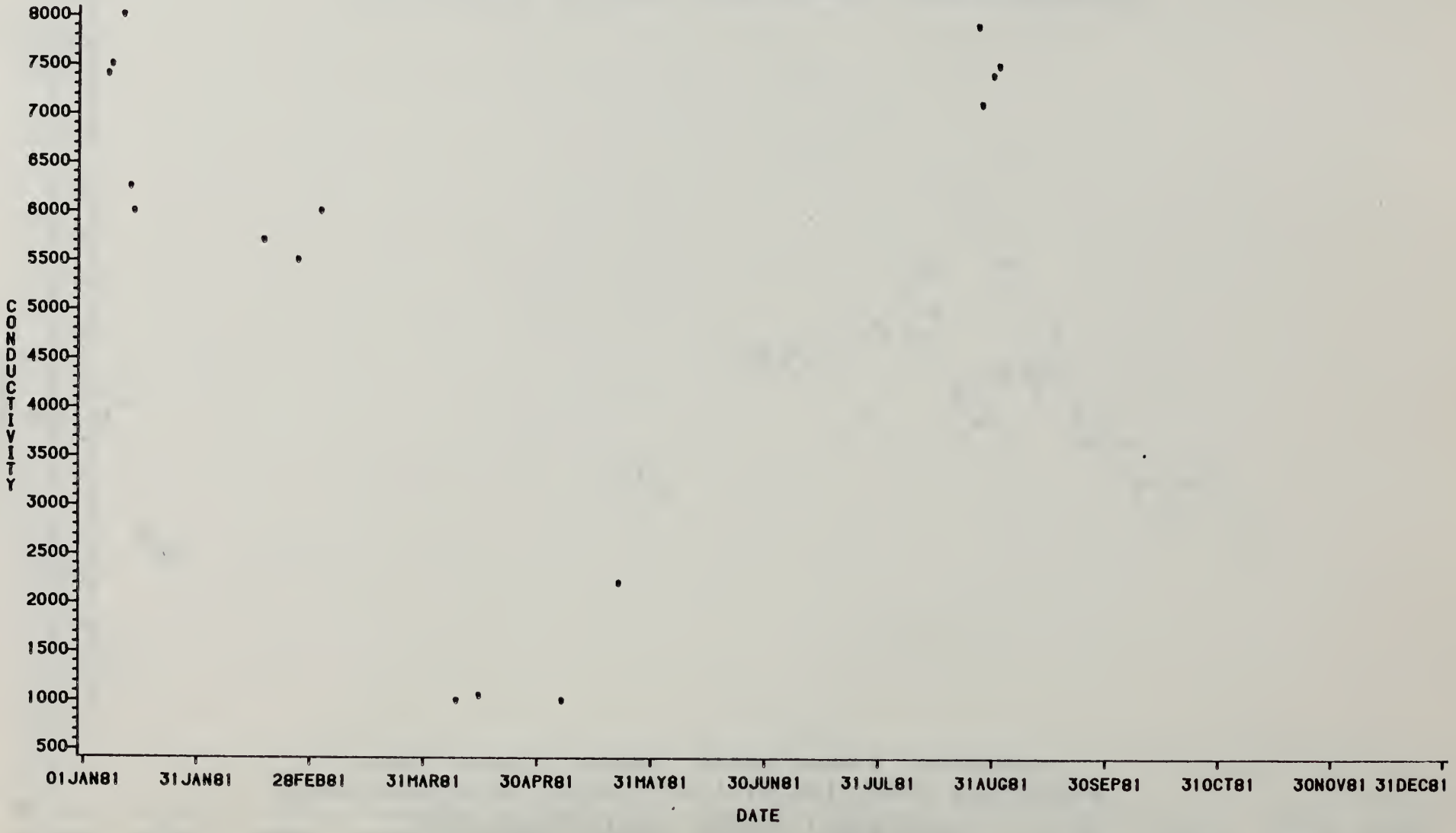
RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM

REPORT YEAR=1981 TYPE=DAMS STATION=YSWPOND-6 PARAMETER=PH



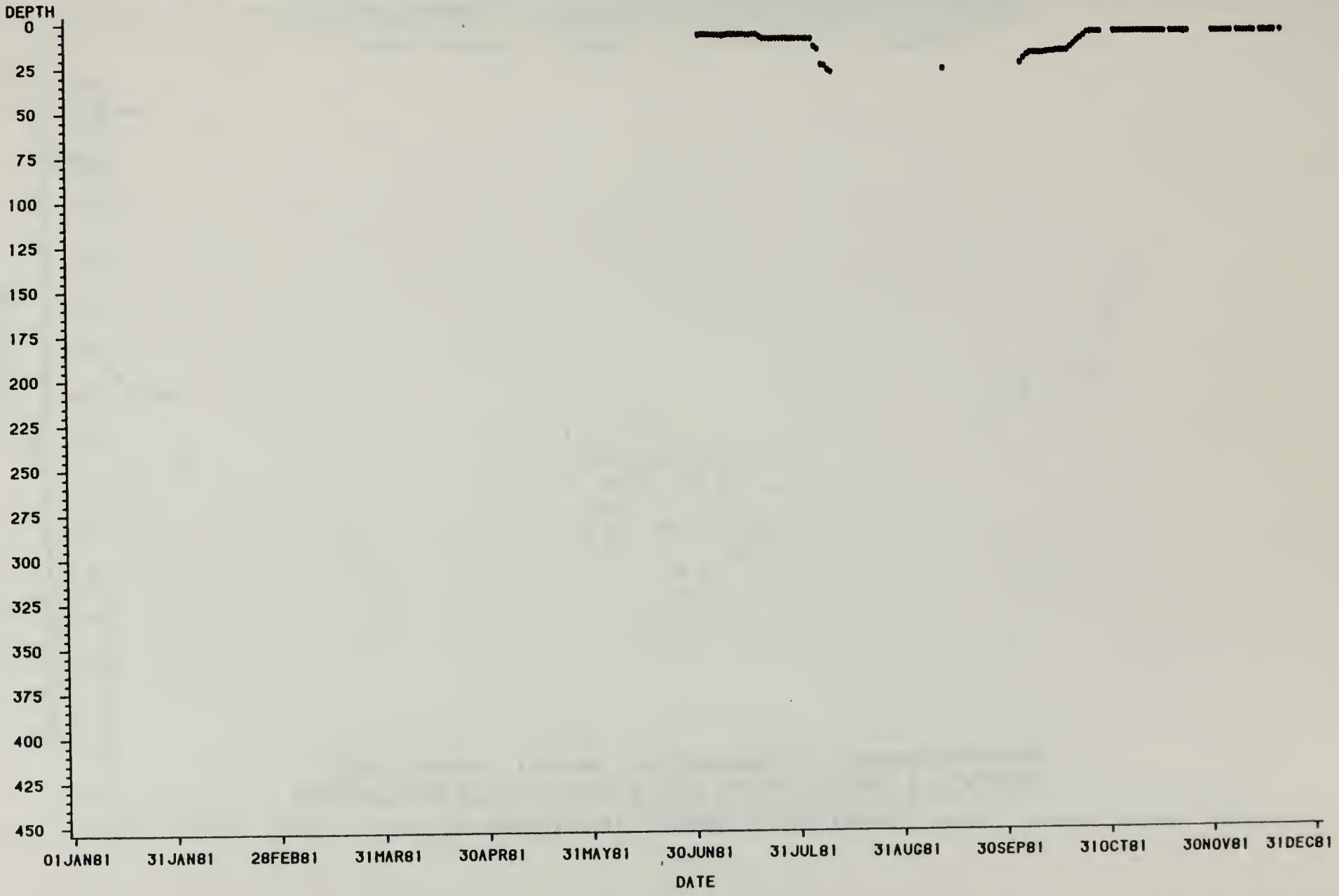
RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM

REPORT YEAR=1981 TYPE=DAMS STATION=YSWPOND-6 PARAMETER=CONDUCTIVITY



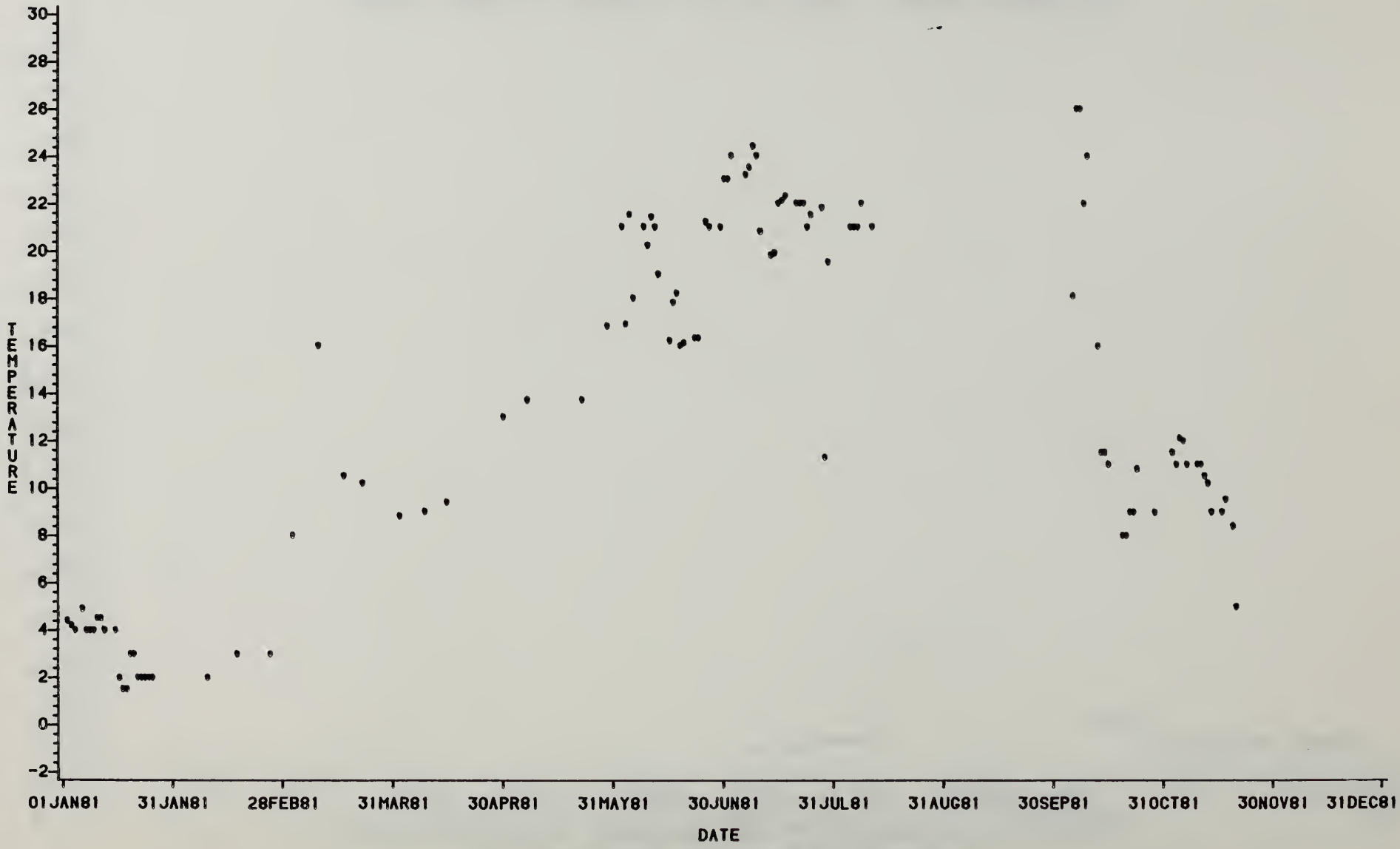
RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM

REPORT YEAR=1981 TYPE=DAMS STATION=YSWPOND-7 PARAMETER=DEPTH



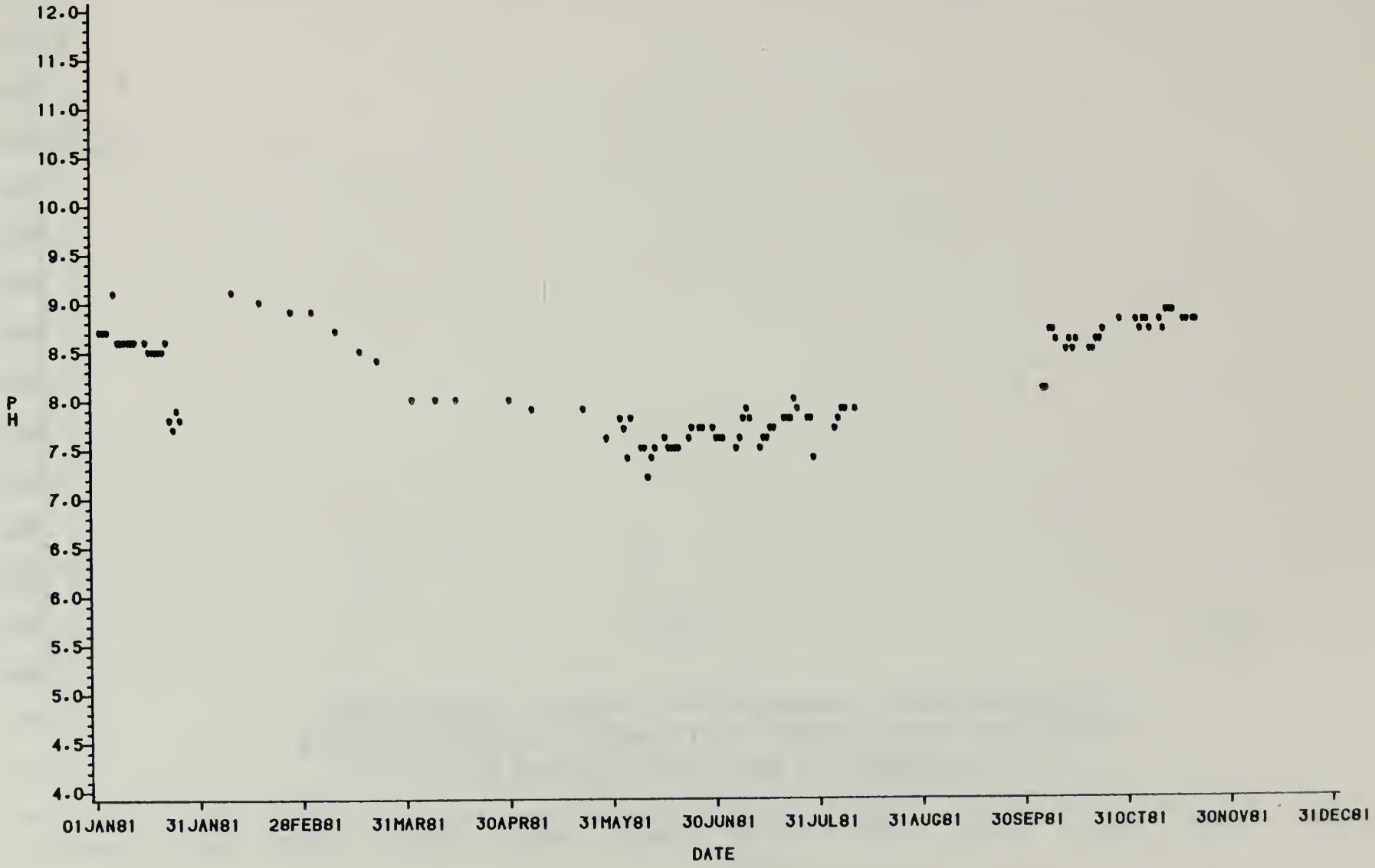
RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM

REPORT YEAR=1981 TYPE=DAMS STATION=YSWPOND-7 PARAMETER=TEMPERATURE



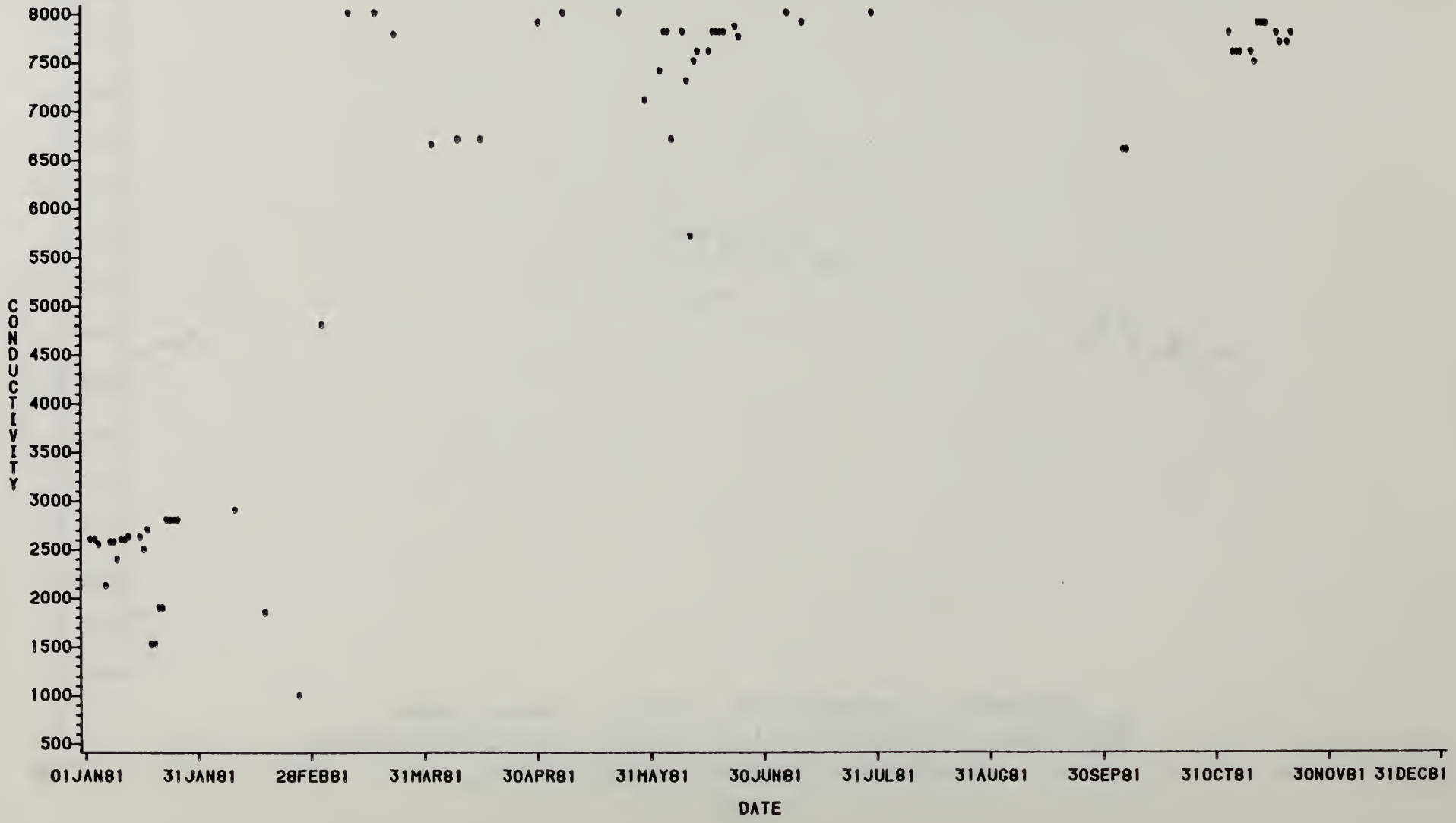
RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM

REPORT YEAR=1981 TYPE=DAMS STATION=YSWPOND-7 PARAMETER=PH



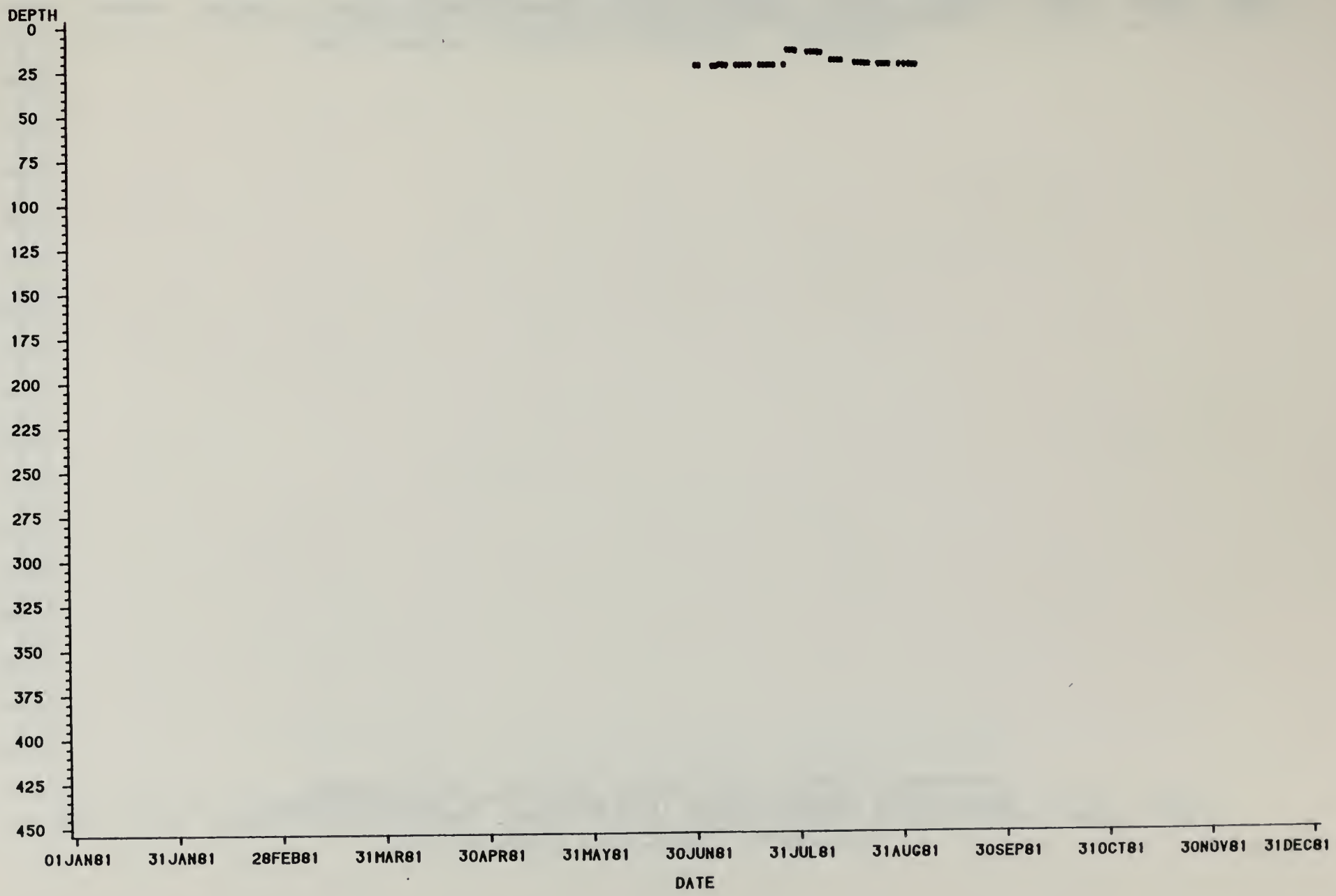
RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM

REPORT YEAR=1981 TYPE=DAMS STATION=YSWPOND-7 PARAMETER=CONDUCTIVITY



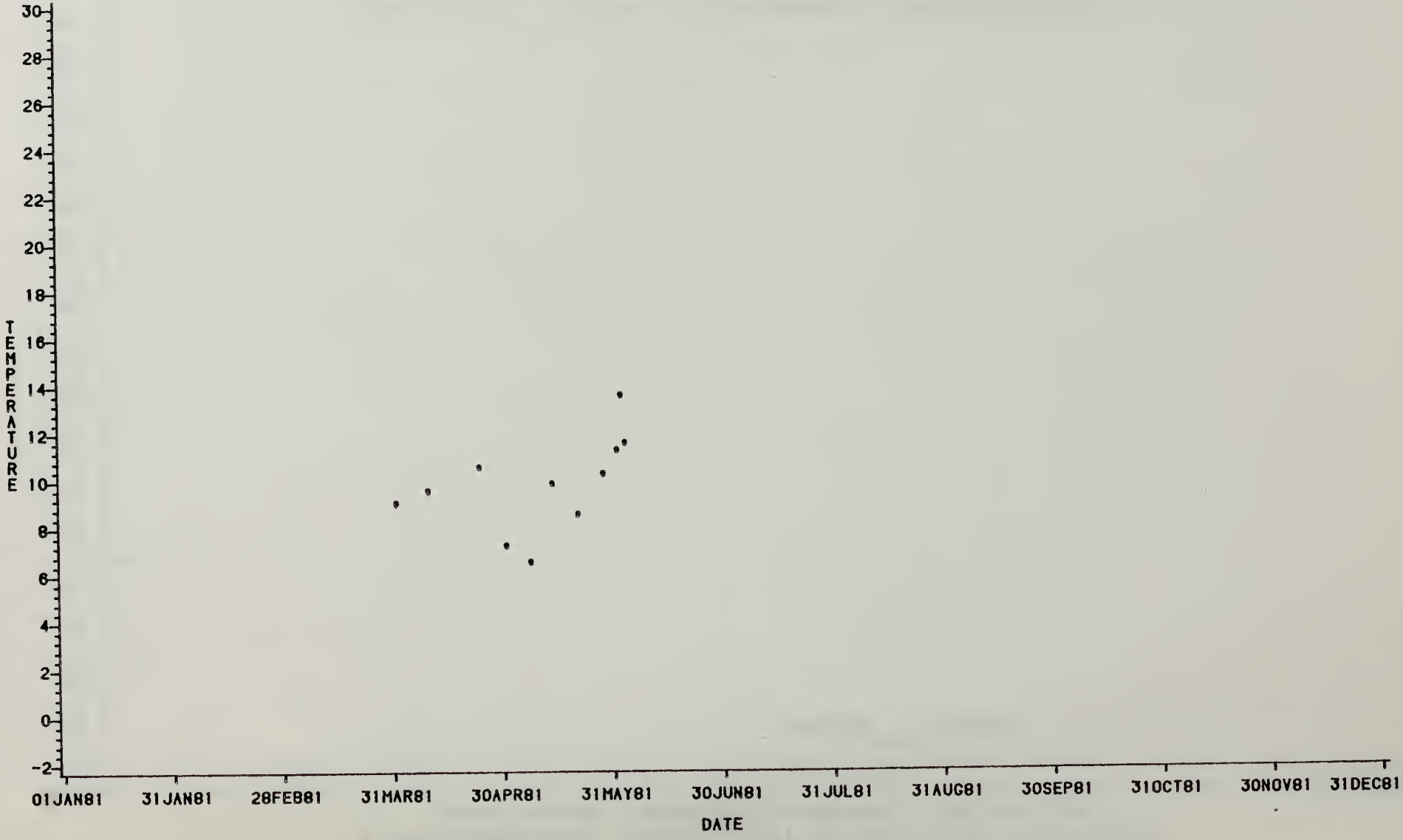
RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM

REPORT YEAR=1981 TYPE=DAMS STATION=YPZR-1 PARAMETER=DEPTH



RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM

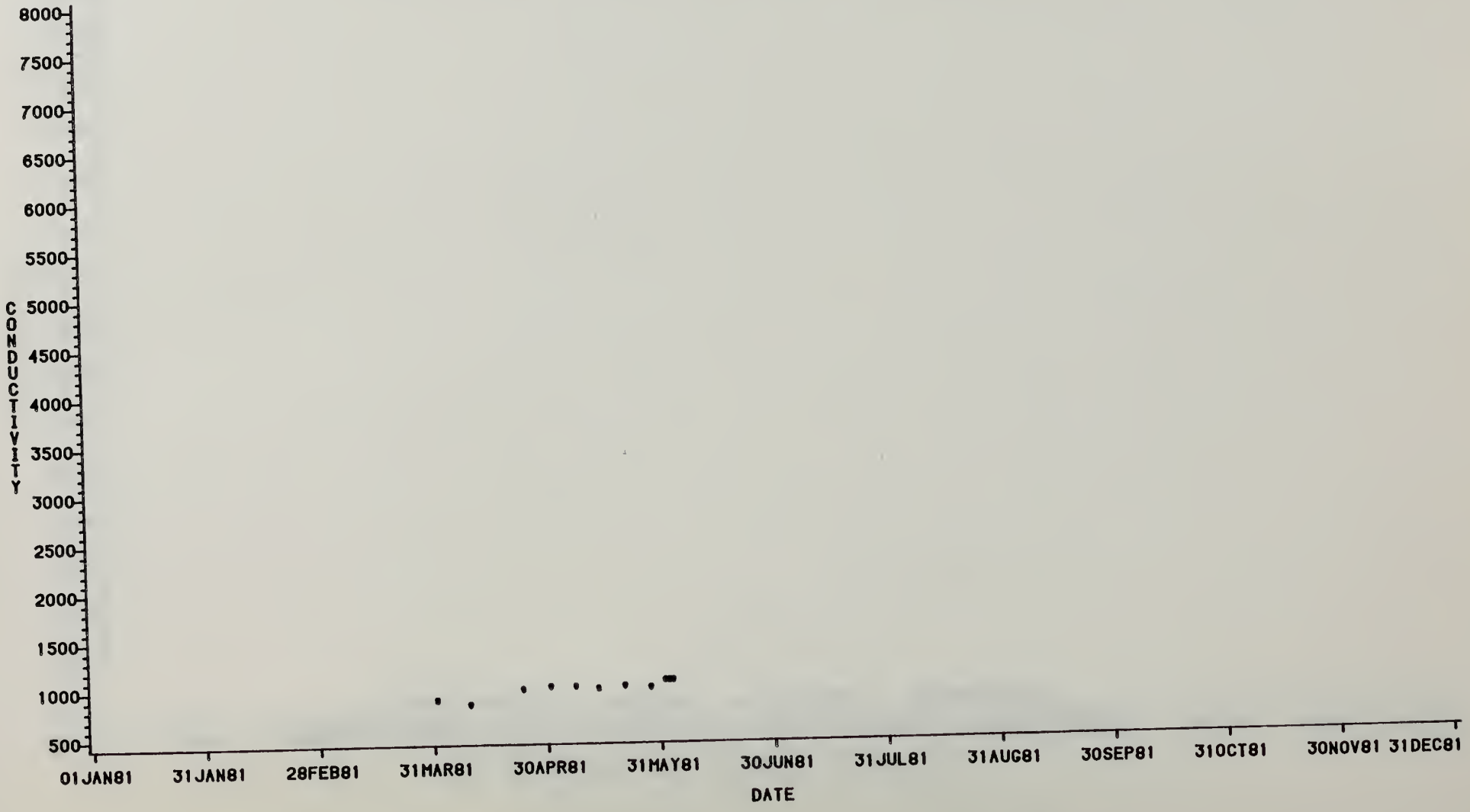
REPORT YEAR=1981 TYPE=DAMS STATION=YPZR-1 PARAMETER=TEMPERATURE



RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM

REPORT YEAR=1981 TYPE=DAMS STATION=YPZR-1 PARAMETER=PH

RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM
REPORT YEAR=1981 TYPE=DAMS STATION=YPZR-1 PARAMETER=CONDUCTIVITY

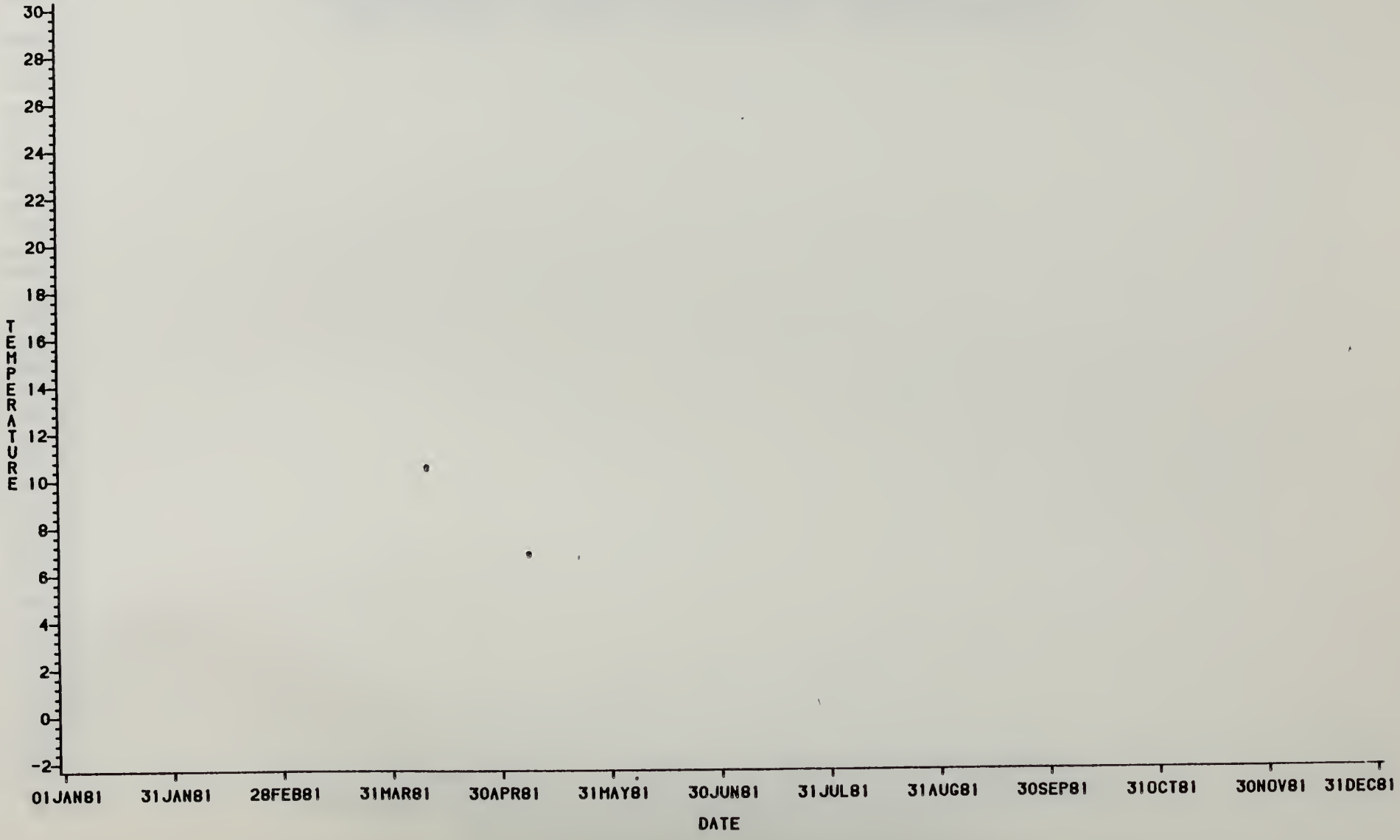


RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM

REPORT YEAR=1981 TYPE=DAMS STATION=YPZR-2 PARAMETER=DEPTH

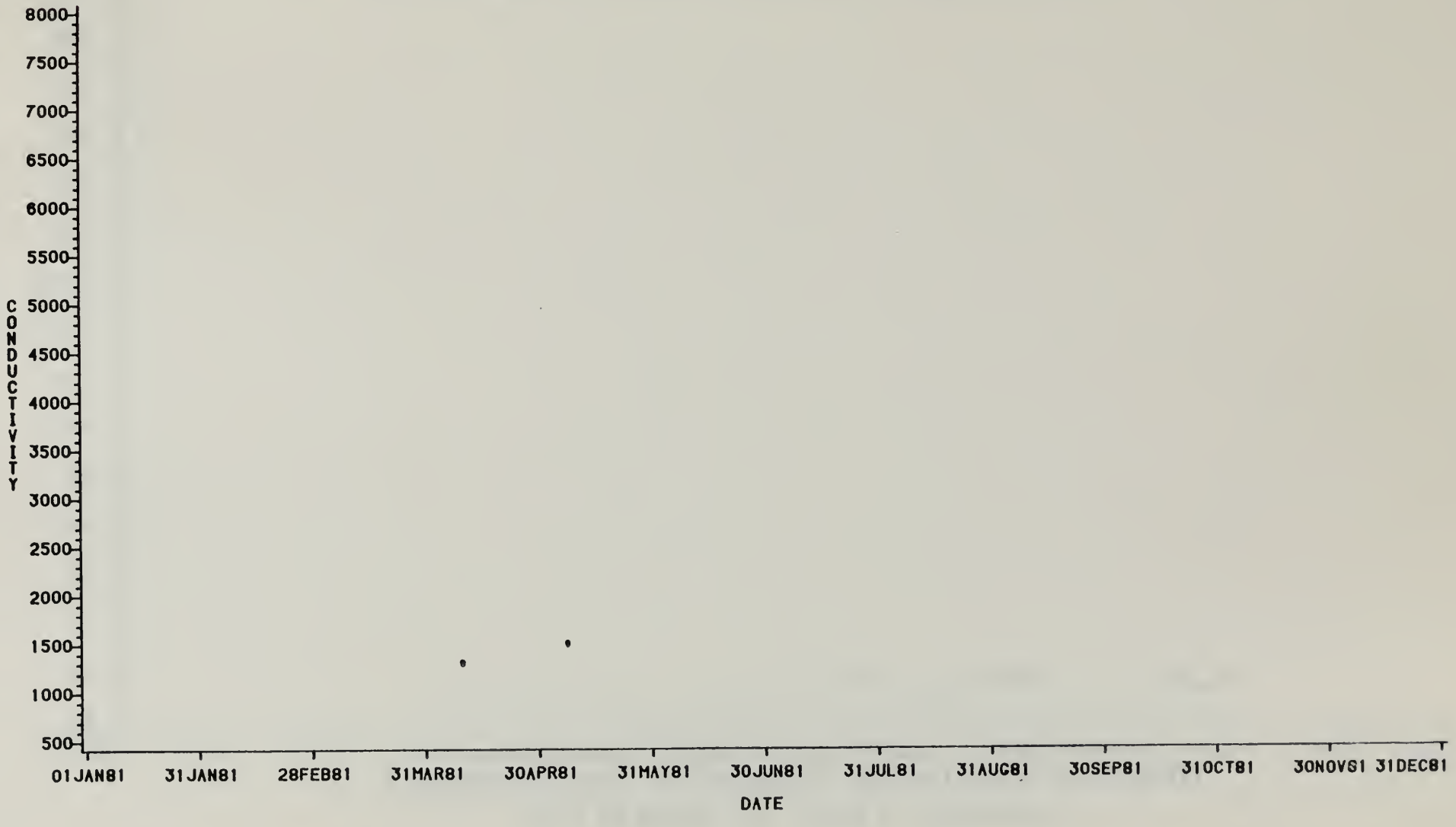
RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM

REPORT YEAR=1981 TYPE=DAMS STATION=YPZR-2 PARAMETER=TEMPERATURE



RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM

REPORT YEAR=1981 TYPE=DAMS STATION=YPZR-2 PARAMETER=CONDUCTIVITY

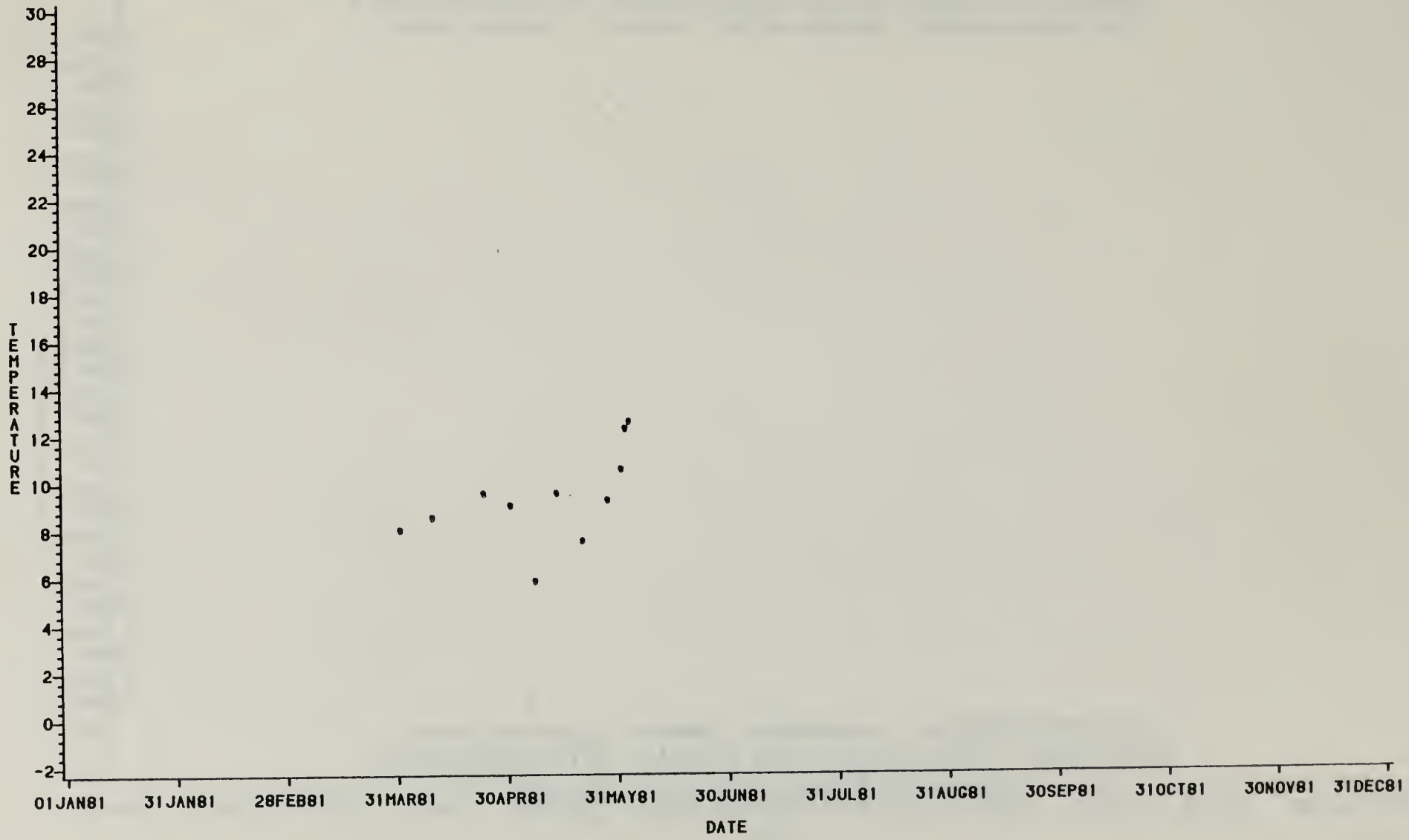


RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM

REPORT YEAR=1981 TYPE=DAMS STATION=YPZR-4 PARAMETER=DEPTH

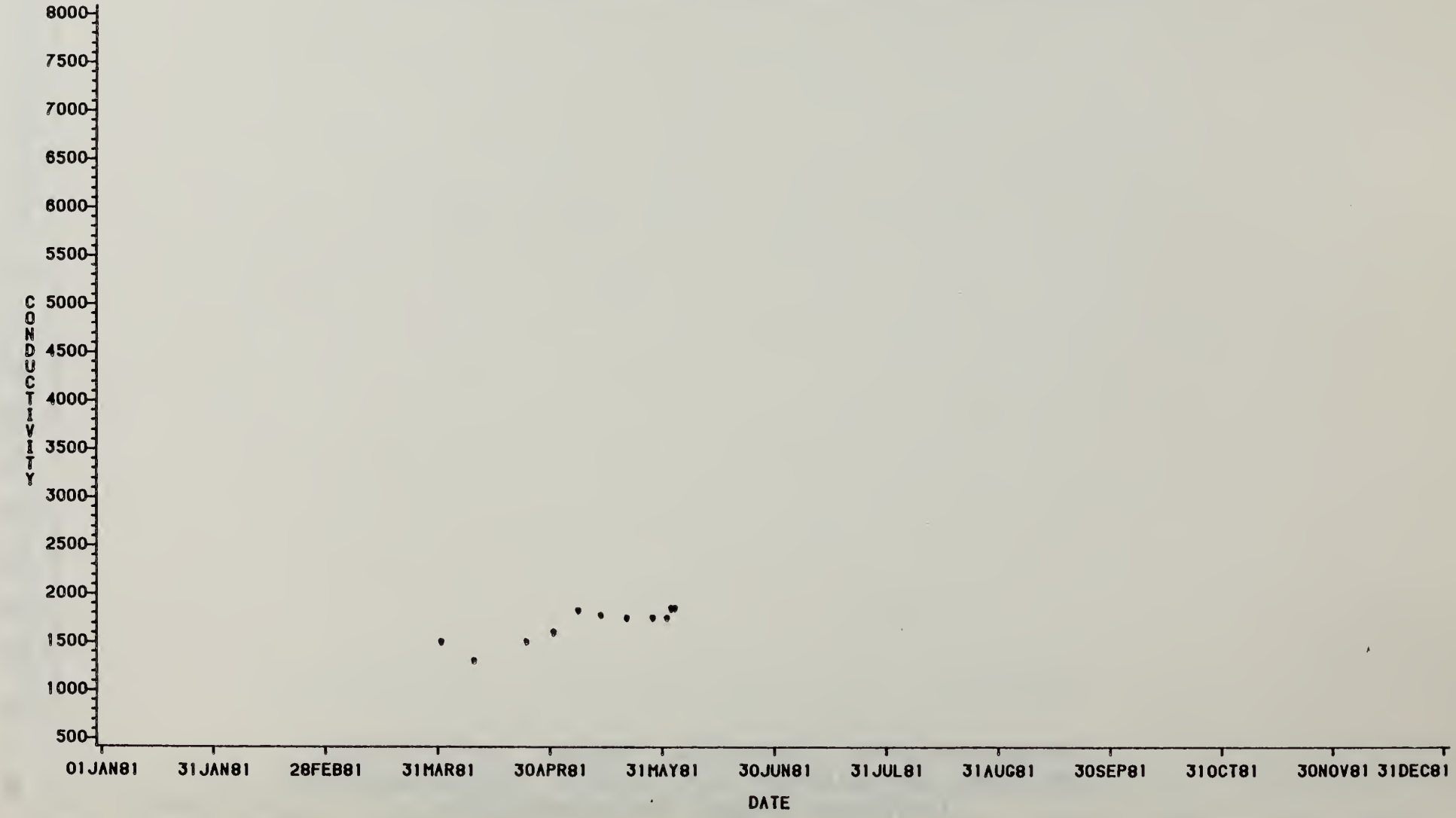
RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM

REPORT YEAR=1981 TYPE=DAMS STATION=YPZR-4 PARAMETER=TEMPERATURE



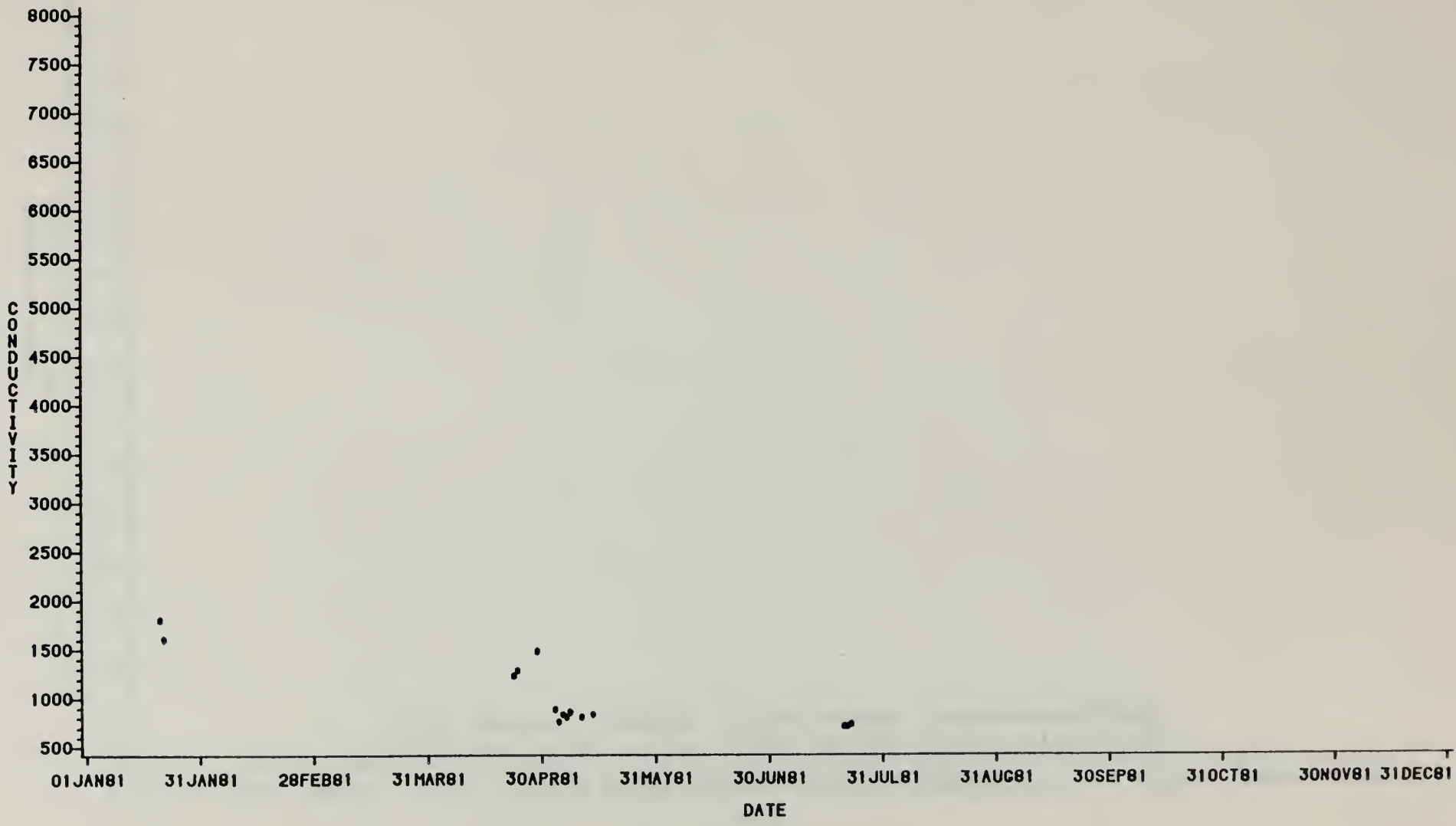
RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM

REPORT YEAR=1981 TYPE=DAMS STATION=YPZR-4 PARAMETER=CONDUCTIVITY



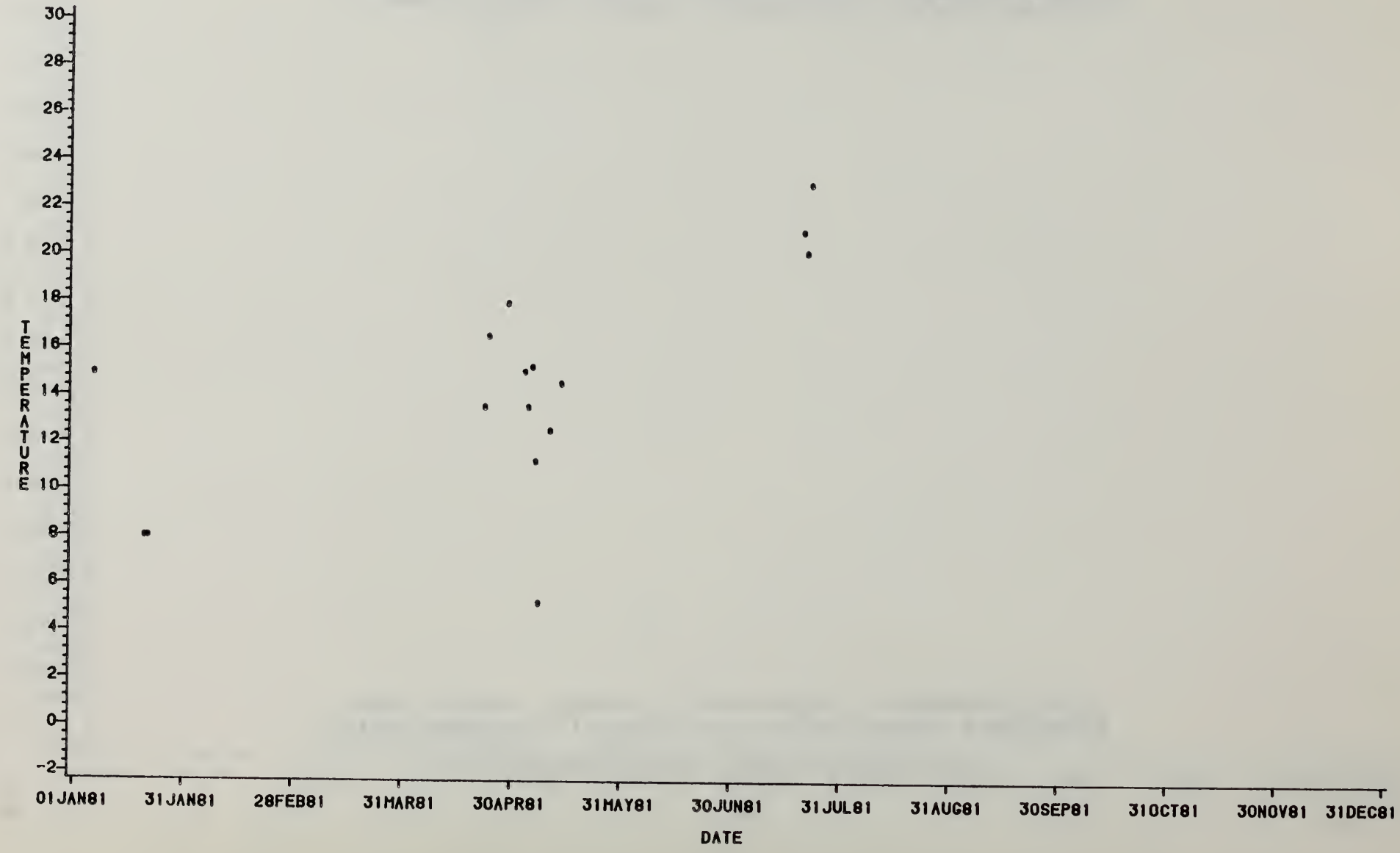
RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM

REPORT YEAR=1981 TYPE=DAMS STATION=YEROPOND PARAMETER=CONDUCTIVITY



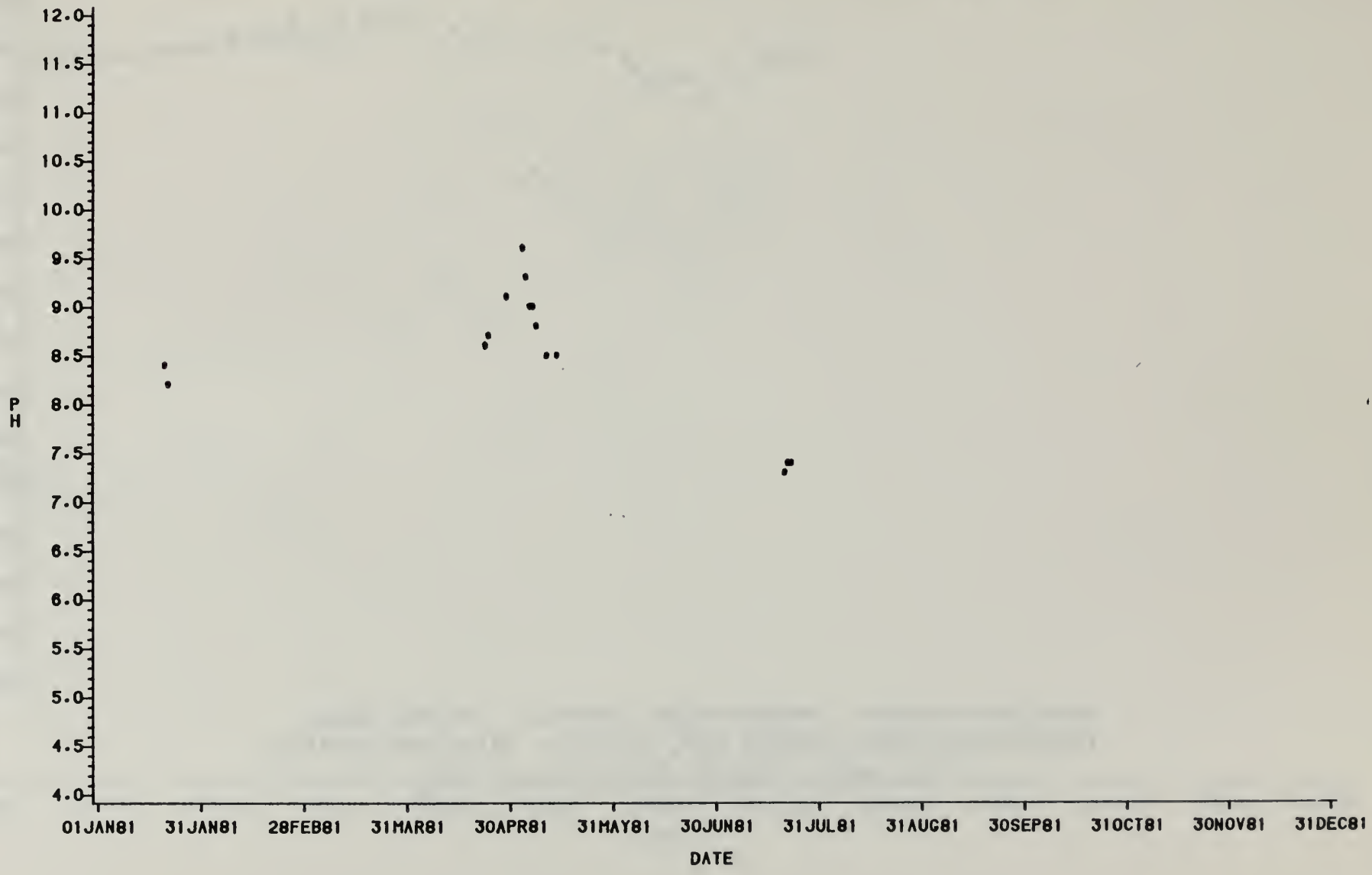
RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM

REPORT YEAR=1981 TYPE=DAMS STATION=YEROPOND PARAMETER=TEMPERATURE



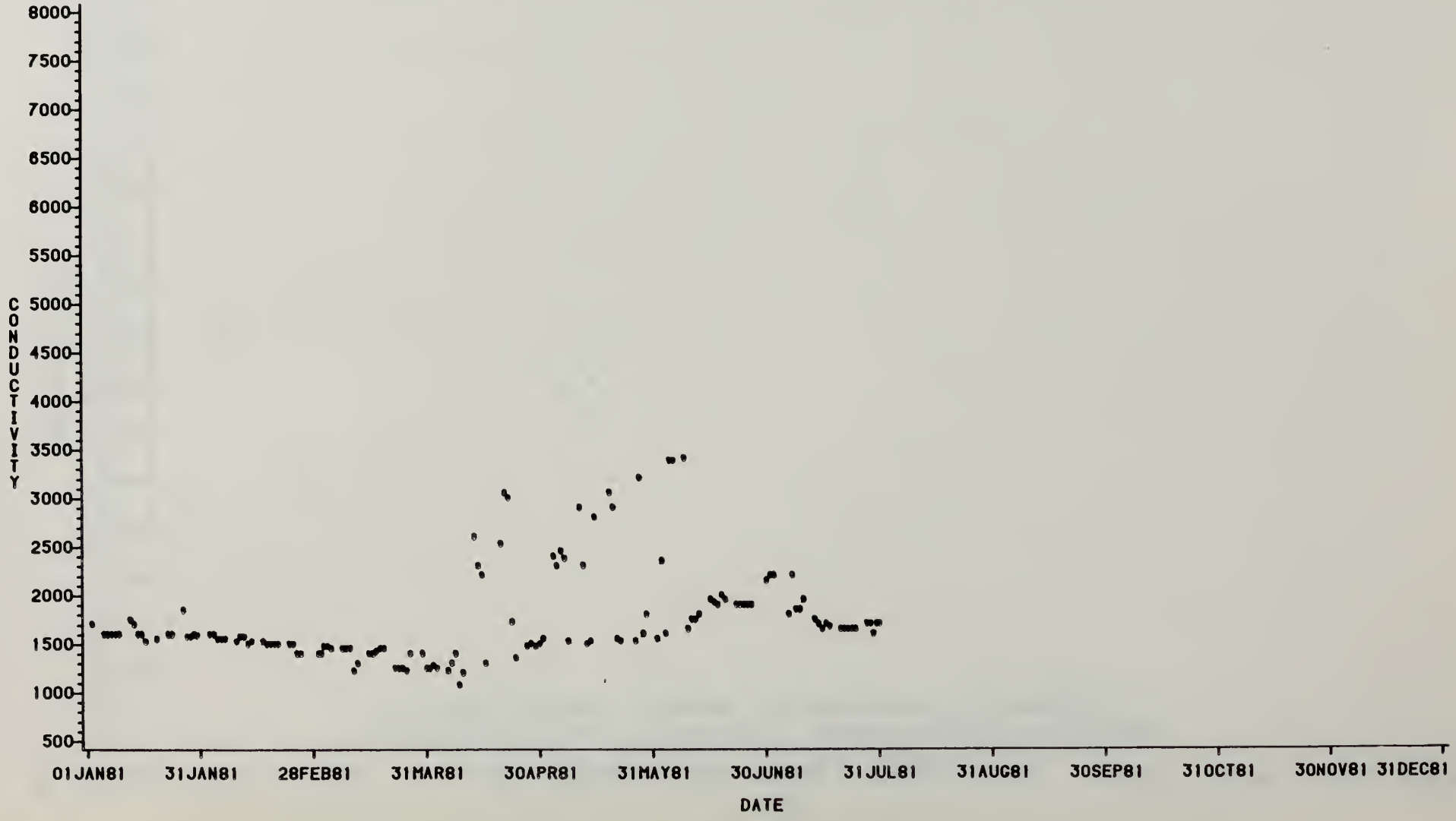
RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM

REPORT YEAR=1981 TYPE=DAMS STATION=YEROPOND PARAMETER=PH



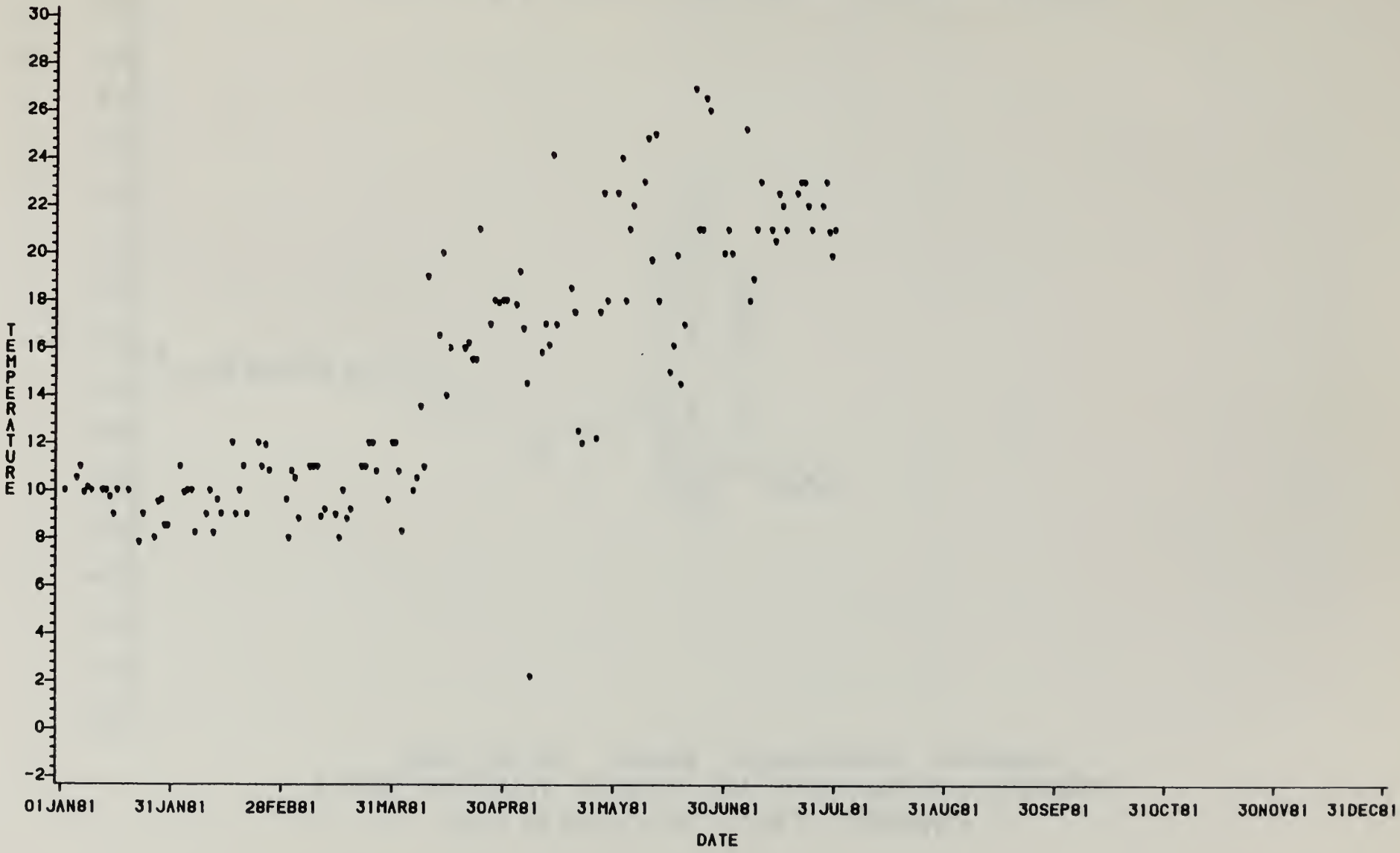
RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM

REPORT YEAR=1981 TYPE=DAMS STATION=YWROPOND PARAMETER=CONDUCTIVITY



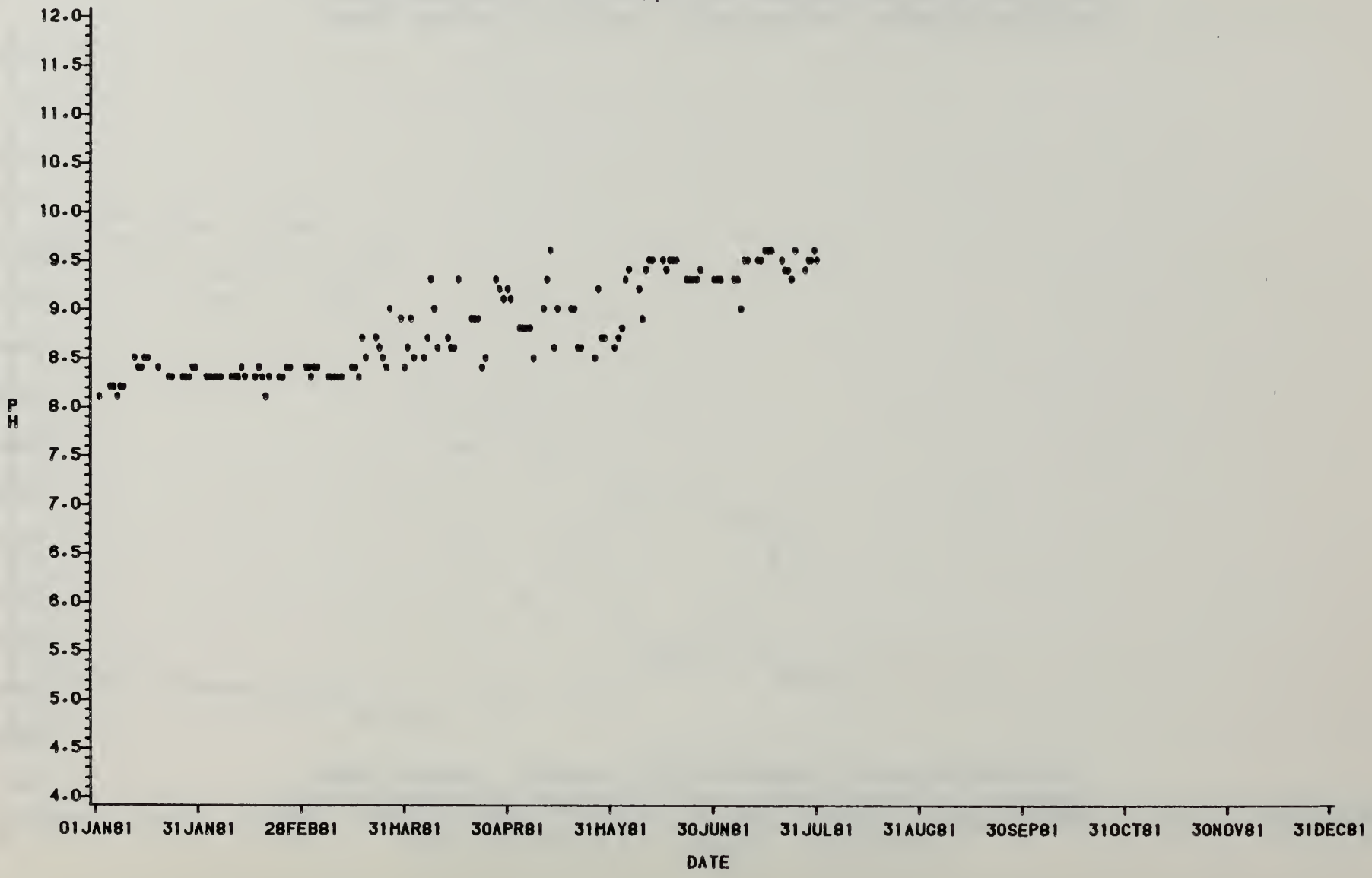
RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM

REPORT YEAR=1981 TYPE=DAMS STATION=YWROPOND PARAMETER=TEMPERATURE



RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM

REPORT YEAR=1981 TYPE=DAMS STATION=YWROPOND PARAMETER=PH



APPENDIX 5-2.2

Operations Water Quality Data
MIS Monitoring Program

RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM
WATER CHEMISTRY DATA - TRACT C-A
OPERATIONS WATER QUALITY DATA - MIS MONITORING PROGRAM

---------- REPORT YEAR=1981 TYPE=DAMS STATION=YERPOND ----------

OBS	DATE	TEMP	PH	SPC COND	WL	AL	AS	BA	BE	B	BR	CD	CA	CL	CR	CU
1	23JAN81	7.0	9.0	2300	.	.	.	.	.	.	.	.	.	.	.	.
2	29JAN81	6.0	8.9	2300	.	.	.	.	.	0.17	.	.	22.00	136.00	.	.
3	10MAR81	.	.	.	.	.	.	.	.	0.51	.	.	4.00	110.00	.	.
4	24MAR81	20.0	8.9	2200	.	.	.	.	.	.	.	.	.	.	.	.
5	27MAR81	10.0	10.5	3100	.	.	.	.	.	.	.	.	13.00	728.00	.	.
6	28MAR81	10.0	8.8	2200	.	.	.	.	.	.	.	.	21.00	122.00	.	.
7	02APR81	.	9.2	2475	.	.	.	.	.	0.34	.	.	22.00	128.00	.	.
8	03APR81	.	.	.	.	.	.	.	.	0.39	.	.	5.02	586.00	.	.
9	29APR81	15.0	9.0	2800	.	.	.	.	.	.	.	.	.	.	.	.
10	07AUG81	.	8.5	3000	.	.	.	.	.	.	.	.	.	.	.	.
11	20AUG81	21.0	8.8	3700	.	0.2	.	.	.	0.11	.	.	28.00	1.69	.	.
12	29SEP81	19.0	8.8	6400	.	.	0.01	.	.	0.18	.	.	27.00	2.62	.	.
13	25NOV81	8.5	9.9	6000	.	.	.	.	.	0.21	.	.	17.00	2.76	.	.

OBS	F	FE	PB	LI	MG	MN	HG	NI	K	SE	AG	NA	SR	V	ZN	SB	BI	GA
1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
2	0.36	.	.	.	72	.	.	.	4.30	.	.	430	.	.	.	.	.	.
3	0.29	.	.	.	7	.	.	.	0.70	.	.	390	.	.	.	.	.	.
4	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
5	.	.	.	.	.	.	.	.	.	.	.	2180	.	.	.	.	.	.
6	.	.	.	.	.	.	.	.	.	.	.	400	.	.	.	.	.	.
7	0.67	.	.	0.21	70	0.07	.	.	8.70	.	.	420	3.72	.	0.01	.	.	.
8	1.10	.	.	0.24	71	.	0.6	.	10.50	.	.	1580	1.20	.	.	.	.	.
9	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
10	.	.	.	.	.	.	0.6	.	.	.	.	.	.	.	.	.	.	.
11	1.57	.	0.06	0.23	77	0.06	1.2	.	5.00	.	.	760	4.71	.	0.04	.	.	.
12	0.34	.	.	.	86	.	3.4	.	4.00	0.04	.	1400	.	.	.	.	.	.
13	1.86	.	.	.	84	.	.	.	2.04	0.07	.	1690	.	.	.	.	.	.

RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM
WATER CHEMISTRY DATA - TRACT C-A
OPERATIONS WATER QUALITY DATA - MIS MONITORING PROGRAM

---------- REPORT YEAR=1981 TYPE=DAMS STATION=YERPOND ----------

OBS	GE	MOL	SNI	STI	WZP	HCO3	CO3	OH	SO4	SO3	S	TSS	TCN	TSO4	TDS	ALK
1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
2	.	.	.	.	.	534	1.28	.	660	.	.	.	.	.	1672	483
3	.	.	.	.	.	378	0.13	0.5	698	.	.	.	0.02	5.9	704	427
4	.	.	.	.	.	315	6.16	.	.	.	.	.	.	0.0	.	395
5	.	.	.	.	.	576	164.00	.	1315	.	.	.	0.00	.	.	.
6	.	.	.	.	.	366	4.81	.	1147	.	.	.	0.00	.	.	.
7	.	.	.	.	.	388	12.00	.	720	1	.	.	0.00	320.0	1756	539
8	.	0.2	.	.	.	879	101.00	.	1800	19	10.8	.	0.00	400.0	4040	2449
9	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
10	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
11	.	.	.	.	.	505	6.25	.	1261	.	.	.	.	.	2732	547
12	.	0.1	.	.	.	854	.	.	2380	.	.	4	.	.	4634	729
13	.	.	.	.	.	729	52.50	.	2162	.	.	16	.	.	5011	1506

OBS	HARD	PO4	NH3	NO2	NO3	TCC	DOC	CN	PHE	OG	BOD	COD	SIO2	KJEL	CRTHOP	ALPHA	BETA
1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
2	351	0.27	.	438.000	0.2	.	16	.	.	.	.	.	15	.	.	.	.
3	36	0.30	4.20	8.000	1.9	.	0	.	.	.	.	.	5	.	.	.	.
4	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
5	.	.	.	.	.	52	.	.	.	.	.	92	.	.	.	.	.
6	.	.	.	.	.	17	.	.	.	.	.	22	.	.	.	.	.
7	343	0.29	10.70	0.407	1.8	.	10	.	0.02	.	.	14	15	.	.	14	26
8	304	0.19	10.10	0.168	0.2	.	18	.	0.27	1609	.	59	3	.	.	38	18
9	.	.	.	.	.	7	7	.	.	.	.	.	.	.	.	0	14
10	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
11	386	0.03	5.73	.	0.1	.	11	.	.	.	.	.	13	.	.	3	9
12	421	0.15	14.97	.	0.7	.	16	.	.	.	.	.	14	.	.	.	.
13	388	0.20	0.64	.	.	.	21	.	.	.	.	.	17	.	.	.	.

RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM
WATER CHEMISTRY DATA - TRACT C-A
OPERATIONS WATER QUALITY DATA - MIS MONITORING PROGRAM

---------- REPORT YEAR=1981 TYPE=DAMS STATION=YPZR-1 ----------

OBS	DATE	TEMP	PH	SPC COND	WALL	ALSA	BAE	B	BR	BCDA	CL	CRU	F	CAE	PBH	LIT
14	01APR81	9	7.7	875	.	.	.	0.16	.	.	88	9.41	.	.	0.16	.	.	.

OBS	MG	MN	HGI	K	SEA	NAR	SVN	ZNB	SIA	BGE	GLN	MOSI	TW	ZR	HCO3	CO3	OH	SO4	SO3	S	TSS
14	44	.	.	2.3	.	.	62	.	.	.	.	.	.	.	.	.	.	336	.	.	297	.	.	.

OBS	TCN	TSO4	TDS	ALK	HARD	PO4	NH3	NO2	NO3	TCC	DCN	PHE	BOD	COD	SI02	KJEL	ORTHOP	ALPHA	BETA
14	.	.	688	294	400	0.15	8.71	0.005	1.1	.	17	.	.	.	.	.	15	.	.	.	.

RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM
WATER CHEMISTRY DATA - TRACT C-a
OPERATIONS WATER QUALITY DATA - MIS MONITORING PROGRAM

---------- REPORT YEAR=1981 TYPE=DAMS STATION=YPZR-4 ----------

OBS	DATE	TEMP	PH	SPC COND	WL	AL	AS	AB	BE	B	BR	CD	CA	CL	CR	CU	F	FE	PB	LI
15	01APR81	8	7.5	1500	.	.	.	.	.	0.61	.	.	150	25.2	.	.	0.1	.	.	.

OBS	MG	MN	HG	NI	K	SE	AG	NA	SR	V	ZN	SB	I	BA	GE	LI	MO	SN	T	W	ZR	HCO3	CO3	OH	SO4	SO3	SS	TSS
15	90	.	.	.	2.4	.	.	120	.	.	.	.	.	.	.	.	.	.	.	.	.	598	.	.	458	.	.	.

OBS	TCN	TS04	TDS	AL K	HARD	PO4	NH3	NO2	NO3	TOC	DOC	CN	PHE	BOD	COD	SI02	KJEL	ORTHO PHOS	ALPHA BETA
15	.	.	1268	509	744	0.14	2.27	0.003	1.2	.	18	.	.	.	.	.	21	.	.	.	.

RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM
WATER CHEMISTRY DATA - TRACT C-A
OPERATIONS WATER QUALITY DATA - MIS MONITORING PROGRAM

---------- REPORT YEAR=1981 TYPE=DAMS STATION=YSWPOND-1 ----------

OBS	DATE	TEMP	PH	SPC COND	WAL	AAS	BAE	BB	BR	CD	CA	CL	CR	CU
16	15JAN81	3.0	8.8	32000	.	.	.	.	0.18	.	.	2.4	568.00	.	.
17	01MAR81	5.5	8.9	38000	.	.	0.04	.	0.96	.	.	18.0	1976.00	.	0.06
18	01APR81	.	.	34000	.	.	.	.	.	.	.	.	.	.	.
19	07MAY81	16.0	9.1	40000	.	.	0.01	.	0.66	.	0.1	24.0	515.00	.	0.10
20	01JUL81	22.8	9.2	42000	.	.	.	.	0.05	.	.	23.0	1.89	.	.
21	30SEP81	12.0	9.3	42000	.	.	0.02	.	0.48	.	.	14.0	11.92	.	.

OBS	F	FE	PB	LI	MG	MN	HG	NI	K	SE	AG	NA	SR	V	ZN	SB
16	1.36	0.13	.	.	113	.	.	.	0.5	.	.	14100	.	.	.	.
17	0.14	0.97	.	.	111	.	.	.	5.1	3.00	.	11580	5.10	.	.	.
18	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
19	0.38	0.26	.	0.38	110	0.12	.	0.29	3.5	0.09	.	16000	4.84	.	0.05	.
20	1.50	.	.	.	150	.	0.6	.	4.7	.	.	16400	.	.	.	.
21	0.87	.	.	.	150	.	.	.	7.0	0.15	.	17000	.	.	.	.

RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM
WATER CHEMISTRY DATA - TRACT C-A
OPERATIONS WATER QUALITY DATA - MIS MONITORING PROGRAM

---------- REPORT YEAR=1981 TYPE=DAMS STATION=YSWPOND-1 ----------

OBS	BI	GA	GE	MCL	SN	TIW	ZR	HCO3	CO3	OH	SO4	SO3	S	TSS	TCN	TSO4	TDS
16	.	.	.	.	.	.	.	184	0.10	0.5	20926	.	.	.	.	.	40004
17	0.02	.	.	.	.	.	.	6842	57.80	.	21432	.	1874.0	.	.	0	42600
18	.	.	.	.	.	.	.	.	.	.	23441	80	.	.	.	.	.
19	0.01	.	.	0.5	.	.	.	3798	77.80	.	28055	.	320.8	.	.	.	43512
20	.	.	.	0.3	.	.	.	3426	1.15	.	30048	.	.	14	.	.	49900
21	.	.	.	0.5	.	.	.	4833	2.31	.	31093	.	.	44	.	.	53930

OBS	ALK	HARD	PO4	NH3	NO2	NO3	TOC	DOC	PHE	OG	BOD	COD	SIO2	KJEL	ORTHOP	ALPHA	BETA
16	7059	21	0.48	0.60	.	0.1	.	6	.	.	.	.	.	0	.	.	.	.
17	6744	502	0.61	110.00	0	0.3	.	12	.	0.14	.	.	165	39	.	.	0	151
18	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
19	4548	512	0.17	0.38	.	0.1	.	12	.	0.02	.	.	254	34	.	.	0	28
20	4859	674	0.11	0.03	.	0.3	.	28	.	.	.	.	.	22	.	.	.	.
21	7909	652	0.79	0.17	.	19.1	.	51	.	.	.	.	.	24	.	.	.	.

RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM
WATER CHEMISTRY DATA - TRACT C-A
OPERATIONS WATER QUALITY DATA - MIS MONITORING PROGRAM

---------- REPORT YEAR=1981 TYPE=DAMS STATION=YSWPOND-2 ----------

OBS	DATE	TEMP	PH	SPCOND	WAL	AAS	BAE	BBR	BCD	CCA	CLR
22	15JAN81	5.0	8.2	14000	.	.	.	0.45	.	24.4	430.00	.
23	01MAR81	5.5	10.3	20000	.	.	.	0.66	.	18.0	376.00	.
24	06MAY81	15.0	10.0	20000	.	.	.	0.56	0	12.0	7268.00	.
25	01JUL81	22.5	9.9	21000	.	.	.	0.04	.	5.2	32.20	.
26	15JUL81	.	.	-200	.	.	.	.	.	16.0	65.90	.
27	30SEP81	12.0	9.6	23000	.	.	0.03	.	.	8.5	47.00	.
28	08DEC81	6.6	9.3	80000	.	.	0.03	.	.	25.0	57.98	.

OBS	CU	F	FE	FB	LI	MG	MN	HG	NI	K	SE	AG	NA	SR
22	.	0.97	0.30	.	.	97	.	.	.	4.0	.	.	800	.
23	.	0.12	0.06	.	.	95	.	.	.	4.6	.	.	5700	.
24	0.02	0.84	0.06	.	0.35	98	0.01	.	0.13	3.4	0.03	.	8000	4.64
25	.	1.17	.	.	.	120	.	.	.	2.9	.	.	6900	.
26	.	.	.	.	.	100	.	.	.	3.7	.	.	4970	.
27	.	0.59	.	.	.	92	.	5.1	.	6.5	.	.	7200	.
28	.	7.80	.	.	.	230	.	.	.	12.0	.	.	18400	.

RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM
WATER CHEMISTRY DATA - TRACT C-A
OPERATIONS WATER QUALITY DATA - MIS MONITORING PROGRAM

---------- REPORT YEAR=1981 TYPE=DAMS STATION=YSWPOND-2 ----------

OBS	V	ZN	SB	BI	GA	GE	MOL	SN	TI	W	ZR	HCO3	CO3	OH	SO4	SC3	S	TSS	TCN	TSO4
22	.	.	.	.	.	.	.	.	.	.	.	819	1.00	0.5	12857	.	.	.	.	.
23	.	.	.	.	.	.	.	.	.	.	.	1576	367.00	.	7216	.	.	.	.	0
24	.	0.02	.	.	.	.	0.2	.	.	.	.	116	30.20	.	7930	.	48.6	.	.	.
25	.	.	.	.	.	.	0.5	.	.	.	.	1568	2.62	.	12978	.	.	13	.	.
26	.	.	.	.	.	.	.	.	.	.	.	1066	99.00	.	9366	.	.	.	.	.
27	.	.	.	.	.	.	0.4	.	.	.	.	2105	1.54	.	12700	.	.	18	.	.
28	.	.	.	.	.	.	1.0	.	.	.	.	14432	1.97	.	20071	.	.	75	.	.

OBS	TDS	ALK	HARD	PC4	NH3	NCO2	NNO3	TOC	DOC	CN	PHE	OGD	BOD	COD	SIO2	KJEL	ORTHOP	ALPHA	BETA
22	20172	557	60	0.04	0.20	.	0.1	.	6	.	.	.	.	.	3	.	.	.	.
23	17604	7572	436	0.64	.	.	0.1	.	8	.	.	.	.	.	23	.	.	.	.
24	22584	617	433	0.29	0.03	.	.	.	8	.	0.07	.	.	59	28	.	.	0	84
25	21668	5742	506	0.09	0.02	.	.	.	11	.	.	.	.	.	15	.	.	.	.
26	.	2610	451	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
27	21428	4379	399	0.18	0.21	.	0.5	.	54	.	.	.	.	.	7	.	.	.	.
28	55142	15314	1009	1.50	0.05	.	1.3	.	48	.	.	.	.	.	50	.	.	.	.

RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM
WATER CHEMISTRY DATA - TRACT C-A
OPERATIONS WATER QUALITY DATA - MIS MONITORING PROGRAM

---------- REPORT YEAR=1981 TYPE=DAMS STATION=YSWPOND-3 ----------

OBS	DATE	TEMP	PH	SPC $\bar{C}$OND	WALL	AALS	BAE	BB	BRD	CA	CLR	CC
29	15JAN81	4.0	8.9	4600	.	.	.	.	0.23	.	11.1	2.50	.
30	01MAR81	15.5	9.8	12000	.	.	.	.	0.58	.	16.0	232.00	.
31	06MAY81	16.0	9.3	10050	.	.	.	.	2.07	0	15.0	133.00	.
32	01JUL81	22.0	9.3	1300	.	.	.	.	0.03	.	18.0	2.75	.
33	30SEP81	13.0	8.0	8800	.	.	0.17	.	0.24	.	110.0	1.02	.

OBS	CU	F	FE	PB	LI	MG	MN	HG	NI	K	SE	AG	NA	SR	V	ZN	SB	BI
29	.	1.12	.	.	.	77	.	.	.	0.81	.	.	200	.	.	.	.	.
30	.	0.09	0.05	.	.	86	.	.	.	2.02	.	.	1966	.	.	.	.	.
31	.	0.54	.	.	0.25	88	.	.	.	1.67	0.03	.	2600	3.06	.	.	.	.
32	.	0.86	.	.	.	110	.	.	.	4.70	0.02	.	3700	.	.	.	.	.
33	.	1.22	.	.	.	170	.	8.9	.	4.80	.	.	1000	.	.	.	.	.

RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM
WATER CHEMISTRY DATA - TRACT C-A
OPERATIONS WATER QUALITY DATA - MIS MONITORING PROGRAM

---------- REPORT YEAR=1981 TYPE=DAMS STATION=YSWPOND-3 ----------

OBS	GA	GE	MOL	SNI	STI	W	ZR	HCO3	CO3	OH	SO4	SO3	S	TSS	TSCN	TSO4	TDS	ALK
29	.	.	.	.	.	.	.	855	2.2	0.5	936	.	.	.	.	.	3636	271
30	.	.	.	.	.	.	.	958	52.6	.	3785	.	.	.	.	0	7532	1709
31	.	.	0.2	.	.	.	.	1017	41.0	.	4690	.	60.5	.	.	.	7916	1556
32	.	.	0.2	.	.	.	.	1240	44.7	.	6558	.	.	9	.	.	11560	1817
33	.	.	0.7	.	.	.	.	1272	.	.	3957	.	.	22	.	.	6606	1089

OBS	HARD	PO4	NH3	NO2	NO3	TOC	DOC	CN	PHE	OG	BOD	COD	SI02	SKJEL	ORTHOP	ALPHA	BETA
29	86	0.02	0.20	.	0.8	.	1	.	.	.	.	.	1	.	.	.	.
30	394	.	.	0.000	0.8	.	10	.	.	.	.	.	25	.	.	.	.
31	399	.	0.03	0.037	.	.	5	.	0.01	.	.	81	27	.	.	14	23
32	497	0.02	0.08	.	0.4	.	7	.	.	.	.	.	21	.	.	.	.
33	974	0.31	4.89	.	0.1	.	183	.	.	.	.	.	22	.	.	.	.

RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM
WATER CHEMISTRY DATA - TRACT C-A
OPERATIONS WATER QUALITY DATA - MIS MONITORING PROGRAM

---------- REPORT YEAR=1981 TYPE=DAMS STATION=YSWPOND-4 ----------

DATE	TEMP	PH	SPC COND	WL	AL	AS	BA	BE	B	BR	CD	CA	CL	CR	CU
15JAN81	3.0	8.6	100	.	.	.	.	.	.	.	.	.	.	.	.
08MAY81	13.0	7.9	4900	.	.	0.01	.	.	0.46	.	.	120	86.7	.	.
01JUL81	22.5	7.9	5150	.	.	.	.	.	0.11	.	.	140	30.6	.	.
30SEP81	12.0	8.0	8800	.	.	0.17	.	.	0.12	.	.	44	59.5	.	.

F	FE	PB	LI	MG	MN	HG	NI	K	SE	AG	NA	SR	V	ZN	SB	BI
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1.00	.	.	3.4	62	0.1	1.5	.	350.0	.	.	550	4.31	.	0.02	.	.
2.47	.	.	.	92	.	2.5	.	4.4	.	.	720	.	.	.	.	.
1.32	.	.	.	120	.	1.7	.	5.0	.	.	980	.	.	.	.	.

RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM
WATER CHEMISTRY DATA - TRACT C-A
OPERATIONS WATER QUALITY DATA - MIS MONITORING PROGRAM

---------- REPORT YEAR=1981 TYPE=DAMS STATION=YSWPOND-4 ----------

OBS	GAGE	MOL	SNIWR	HCO3	CO3	OH	SO4	SO3	S	TSS	TCN	TSO4	TDS	ALK	HARD
34	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
35	.	1.2	.	502	.	.	1551	.	39.5	.	.	3260	451	554	
36	.	1.0	.	412	.	.	2548	.	.	4	.	4242	371	728	
37	.	1.1	.	1977	.	.	3350	.	.	51	.	6067	1664	603	

OBS	PO4	NH3	NO2	NO3	TOC	DOC	CN	PHE	OG	BOD	COD	SIO2	KJEL	ORTHOP	ALPHA	BETA
34	.	.	.	.	.	.	.	.	4740	.	.	.	.	.	.	.
35	.	6.65	0.01	0.3	.	83	.	4.52	.	.	368	23	.	.	0	544
36	0.02	10.10	.	.	.	69	.	.	.	.	.	12	.	.	.	.
37	0.12	4.31	.	0.1	.	271	.	.	.	.	.	18	.	.	.	.

RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM
WATER CHEMISTRY DATA - TRACT C-A
OPERATIONS WATER QUALITY DATA - MIS MONITORING PROGRAM

---------- REPORT YEAR=1981 TYPE=DAMS STATION=YSWPOND-5 ----------

DATE	TEMP	PH	SPC COND	WALL	AALS	BASE	BBORON	CRDA	CCACL	CRUF	FEB	PLI
30SEP81	13.5	8.9	64000	.	.	0.31	.	.	0.13	.	.	26	79.91	.	.	1.63	.	.	.

MGN	MGG	HIK	NSE	SAG	NAR	SVN	ZNB	SBI	GAE	GEL	MONA	STNI	WR	ZR	HCO3	CO3	OH
270	.	1.1	.	25	0.05	.	28000	.	.	.	.	.	.	.	1.2	.	.	.	.	13443	3.43	.

SO4	SO3	TSS	TSCN	TSO4	TDS	ALK	HARD	PO4	NH3	N02	N03	TCC	DCN	PHE	HOG	BDD	CCD	SI02	KJEL	ORTHP	ALPHA	BETA
40442	.	.	.	.	.	88070	17033	1176	1.33	1.2	.	.	.	62	.	.	.	.	.	39	.	.	.	.

RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM
WATER CHEMISTRY DATA - TRACT C-A
OPERATIONS WATER QUALITY DATA - MIS MONITORING PROGRAM

---------- REPORT YEAR=1981 TYPE=DAMS STATION=YSWPOND-6 ----------

OBS	DATE	TEMP	PH	SPC COND	WL	AL	AS	BA	BE	B	BR	CD	CA	CL
39	15JAN81	4	0.1	11000	.	.	.	.	.	0.34	.	.	1.3	7.60
40	15JUL81	.	.	-200	.	.	.	.	.	.	.	.	24.0	164.23
41	30SEP81	14	8.4	73000	.	.	0.39	.	.	0.27	.	.	32.0	155.97

OBS	CR	CU	F	FE	PB	LI	MG	MN	HG	NI	K	SE	AG	NA	SR	V	ZN	SB	BI	AG	GE
39	.	.	1.11	.	.	.	106	.	.	.	0	.	.	100	.	.	.	.	.	.	.
40	.	.	.	.	.	.	330	.	.	.	58	.	.	44000	.	.	.	.	.	.	.
41	.	.	1.82	.	.	.	360	.	.	.	35	0.06	.	35000	.	.	.	.	.	.	.

RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM
WATER CHEMISTRY DATA - TRACT C-A
OPERATIONS WATER QUALITY DATA - MIS MONITORING PROGRAM

---------- REPORT YEAR=1981 TYPE=DAMS STATION=YSWPOND-6 ----------

MOL	SN	TI	W	ZR	HCO3	CO3	OH	SO4	SO3	S	TSS	TCN	TSO4	TDS
.	.	.	.	.	769	240.0	0.5	373	.	.	.	.	.	10444
.	.	.	.	.	31488	48.3	.	50240	.	.	.	.	.	.
1.4	.	.	.	.	26949	1.1	.	34093	.	.	41	.	.	98760

AL	HARD	PO4	NH3	NO2	NO3	TOC	DOC	CN	PHE	OG	BOD	COD	SIO2	KJEL	ORTHOP	ALPHA	BETA
705	14	0.24	0.20	.	0.7	.	0	.	.	.	.	.	0	.	.	.	.
.	1418	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
24326	1561	0.01	2.15	.	.	.	283	.	.	.	.	.	65	.	.	.	.

RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM
WATER CHEMISTRY DATA - TRACT C-A
OPERATIONS WATER QUALITY DATA - MIS MONITORING PROGRAM

---------- REPORT YEAR=1981 TYPE=DAMS STATION=YSWPOND-7 ----------

OBS	DATE	TEMP	PH	SPC COND	WL	AL	AS	AB AE	B	BR	BC D	CA	CL	CR	CU
42	16JAN81	4.0	8.6	625	.	.	.	. .	0.24	.	.	4.7	3.8	.	.
43	08MAY81	13.7	7.9	8000	.	0.6	.	. .	0.62	.	0	280.0	29.6	.	0.01
44	01JUL81	23.0	7.6	8300	.	.	.	. .	0.22	.	.	290.0	38.8	.	.

OBS	F	FE	PB	LI	MG	MN	HG	NI	K	SE	AG	NA	SR	V	ZN	SB	BI
42	1.24	.	.	.	3	.	.	.	0.4	.	.	280	.	.	.	.	.
43	0.97	0.05	.	6.9	23	0.04	.	.	910.0	.	.	980	5.8	.	0.12	.	.
44	3.45	.	.	.	22	.	2.4	.	10.5	.	.	1080	.	.	.	.	.

RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM
WATER CHEMISTRY DATA - TRACT C-A
OPERATIONS WATER QUALITY DATA - MIS MONITORING PROGRAM

---------- REPORT YEAR=1981 TYPE=DAMS STATION=YSWPOND-7 ----------

OBS	GAGE	MOL	STNIWR	HC03	CO3	OH	SO4	SO3	S	TSS	TCN	TSO4	TDS	ALK	PARD
42	. .	.	. . . .	860	5.4	0.5	394	.	.	.	. .	.	232	15	62
43	. .	2.6	. . . .	159	.	.	3915	.	17.7	.	. .	.	6296	180	793
44	. .	2.2	. . . .	167	.	.	4276	.	.	6	. .	.	7145	183	814

OBS	PO4	NH3	NO2	NO3	TOC	DOC	CN	PHE	OGD	BOD	COD	SIO2	KJEL	ORTHOP	ALPHA	BETA
42	0.06	42.30	.	0.5	.	172	.	.	. .	.	.	5	.	. .	.	.
43	.	1.54	0.019	0.2	.	94	.	2.34	. .	391	24	.	.	116	1213
44	.	9.61	.	.	.	123	.	.	. .	.	.	9	.	. .	.	.

RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM
WATER CHEMISTRY DATA - TRACT C-A
OPERATIONS WATER QUALITY DATA - MIS MONITORING PROGRAM

---------- REPORT YEAR=1981 TYPE=DAMS STATION=YSWPOND-9 ----------

OBS	DATE	TEMP	PH	SPC COND	WALL	AS	BAE	B	BRD	CA	CL	CRU	F	PBI	LMG
45	09DEC81	9	8.7	4700	.	0.01	.	0.32	.	11	3.57	.	35	.	29

OBS	MN	HG	NIK	SEG	AA	SRV	ZNB	SBIAE	GELNIWR	MOST	HCO3	CO3	OH	SO4	SCO3	S
45	.	0.8	. 15	. .	2.5	.	.	.	.	.	15.17	13.8	.	5.49	.	.

OBS	TSS	TCN	TSO4	TDS	ALK	HARD	PO4	NH3	NO2	NO3	TOC	DOC	CNE	PHEG	BOD	CCD	SI02	KJEL	ORTHOP	ALPHA	BETA
45	291	.	.	1663	1606	146	0.52	5.23	.	7.1	.	1019	.	.	.	.	.	15	.	.	.	.

RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM
WATER CHEMISTRY DATA - TRACT C-A
OPERATIONS WATER QUALITY DATA - MIS MONITORING PROGRAM

---------- REPORT YEAR=1981 TYPE=DAMS STATION=YWRPOND ----------

OBS	DATE	TEMP	PH	SPC COND	WL	AL	AS	BA	BE	BB	BR	CD	CA	CL	CR
46	09JAN81	15.0	8.1	1450	.	0.1	.	0.1	.	0.21	0.2	.	33.6	3.70	.
47	15JAN81	14.0	8.0	1450	.	.	.	.	.	.	.	.	.	.	.
48	29JAN81	14.0	8.0	1400	.	.	.	.	.	0.24	.	.	41.0	8.34	.
49	24MAR81	14.5	7.8	1500	.	.	.	.	.	.	.	.	.	.	.
50	29APR81	16.2	8.1	1450	.	.	.	.	.	.	.	.	.	.	.
51	05MAY81	15.0	8.1	1425	.	.	.	.	.	0.29	0.8	.	34.0	8.40	.
52	07AUG81	.	7.9	1425	.	.	.	.	.	.	.	.	.	.	.
53	29SEP81	15.5	8.3	1400	.	.	.	.	.	.	.	.	36.0	9.36	.
54	25NOV81	10.5	8.5	1400	.	.	.	.	.	0.23	.	.	37.0	8.88	.

OBS	CU	F	FE	PB	LI	MG	MN	HG	NI	K	SE	AG	NA	SR	V	ZN	SB	BI
46	.	0.23	.	.	0.12	76	.	0.3	.	0.59	.	.	210	0.7	0.5	0.02	.	.
47	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
48	.	0.46	.	.	.	78	.	.	.	0.59	.	.	220	.	.	.	.	.
49	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
50	0.18	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
51	.	0.41	.	.	0.14	71	.	0.5	.	0.50	.	.	200	5.6	.	.	.	.
52	.	.	.	.	.	.	.	0.4	.	.	.	.	.	.	.	.	.	.
53	.	0.27	.	.	.	78	.	3.8	.	0.34	.	.	200	.	.	.	.	.
54	.	1.59	.	.	.	79	.	.	.	0.67	.	.	190	.	.	.	.	.

RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM
WATER CHEMISTRY DATA - TRACT C-A
OPERATIONS WATER QUALITY DATA - MIS MONITORING PROGRAM

---------- REPORT YEAR=1981 TYPE=DAMS STATION=YWRPOND ----------

OBS	GA	GE	MOL	SN	TI	WR	HCO3	CO3	OH	SO4	SO3	S	TSS	TSCN	TSO4	TDS	ALK
46	0.5	0.1	0.1	.	0.5	.	545	1.00	0.5	358	.	0.1	.	.	.	1004	470
47	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
48	.	.	.	.	.	.	559	1.03	.	453	.	.	.	.	.	1108	491
49	.	.	.	.	.	.	541	.	.	.	.	.	.	.	0	.	465
50	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
51	.	.	.	.	.	.	551	.	.	371	.	0.2	.	.	.	980	468
52	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
53	.	.	.	.	.	.	537	.	.	400	.	.	.	.	.	1027	474
54	.	.	.	.	.	.	557	.	.	379	.	.	4	.	.	1033	461

OBS	HARD	PO4	NH3	NO2	NO3	TOC	DOC	CN	PHE	OG	BOD	COD	SIO2	KJEL	ORTHOP	ALPHA	BETA
46	97	.	23.00	23.00	0.7	.	4	0.05	0.06	.	.	.	3	.	.	0	5
47	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
48	423	0.01	.	47.00	1.2	.	6	.	.	.	.	.	24	.	.	.	.
49	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
50	.	.	.	.	.	3	.	.	.	.	.	.	.	.	.	0	2
51	377	.	0.04	0.01	0.4	.	5	.	0.00	.	.	10	26	.	.	4	0
52	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
53	410	0.06	0.17	.	.	.	6	.	.	.	.	.	19	.	.	.	.
54	417	0.04	0.01	.	0.1	.	4	.	.	.	.	.	26	.	.	.	.

RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM
WATER CHEMISTRY DATA - TRACT C-A
OPERATIONS WATER QUALITY DATA - MIS MONITORING PROGRAM

---------- REPORT YEAR=1981 TYPE=DAMS STATION=Y24RDS ----------

0 3 S	DATE	TEMP	PH	SPC COND	WL	AL	AS	AB	BE	B	BR	CD	CA	CL	CR	CU	F	FE	PB
65	24MAR81	5.4	7.8	2000	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

0 3 S	LIG	MNG	MHG	NIK	SE	AG	NAR	SRV	ZN	SB	GI	GA	GE	MOL	STN	ZWR	HCO3	CO3	OH	SO4
65	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	678	.	.	.

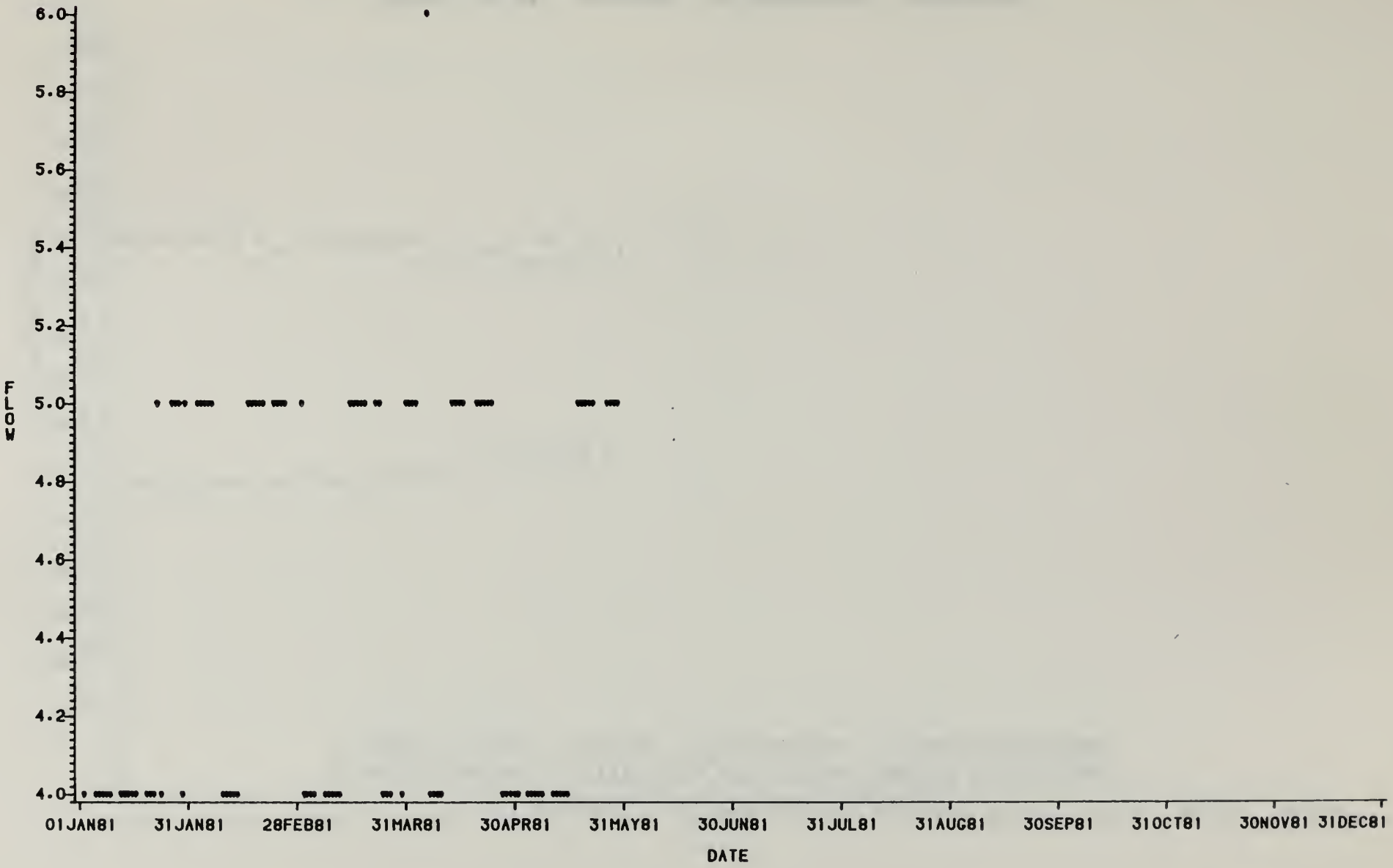
0 3 S	SO3	TSS	TSC	TSO N4	TSD S	AL K	HAR D	PRO 4	NHO 3	NNO 2	NNO 3	TOC	DCC	CNE	HGD	OGD	CDD	SIO 2	KLE	ORTHO PHOS	ALPHA	BETA
65	.	.	.	.	0	.	577	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

APPENDIX 5-2.3

Springs and Seeps Data
Field Data

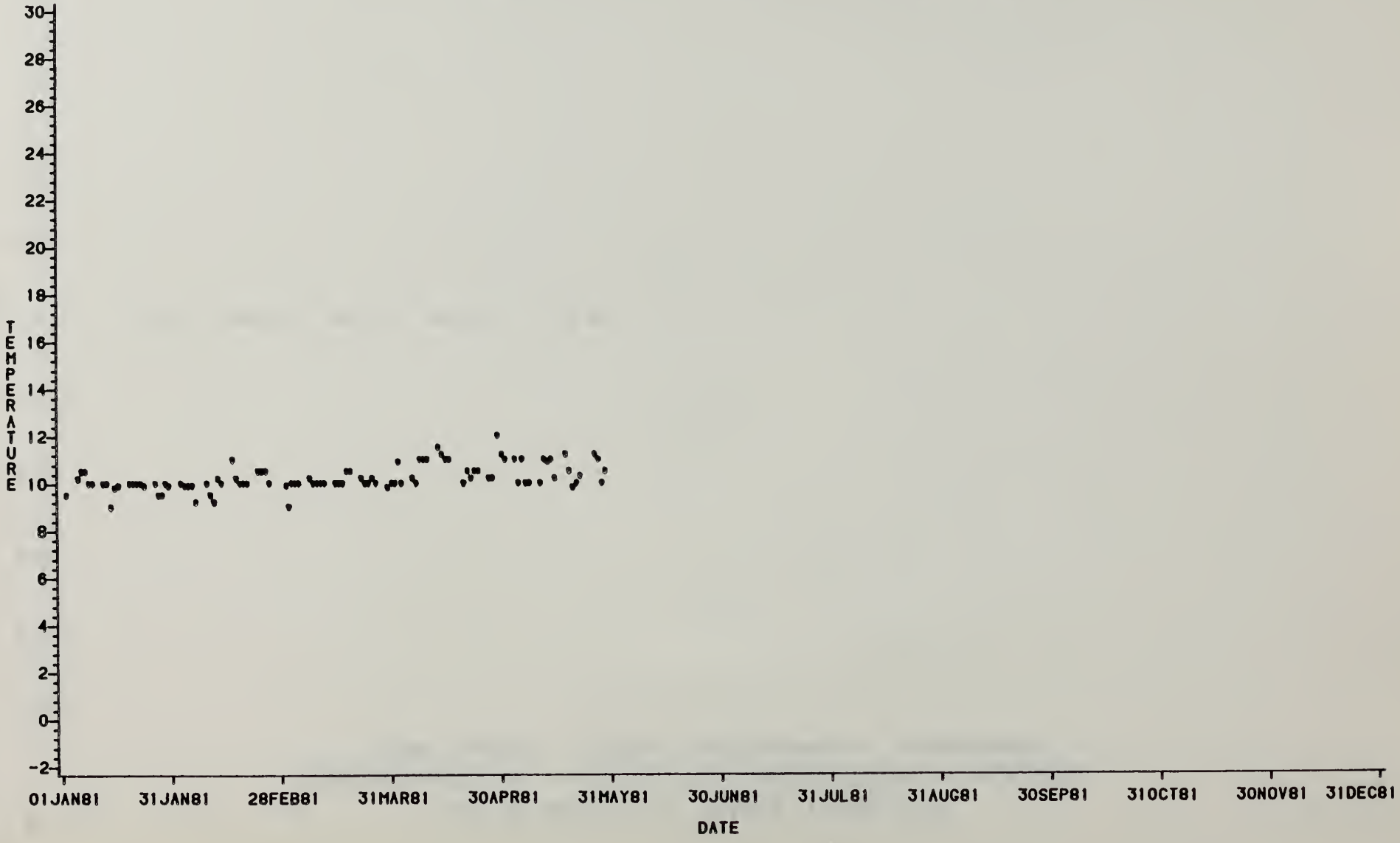
RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM

REPORT YEAR=1981 TYPE=SEEP STATION=SPG-MILL PARAMETER=FLOW



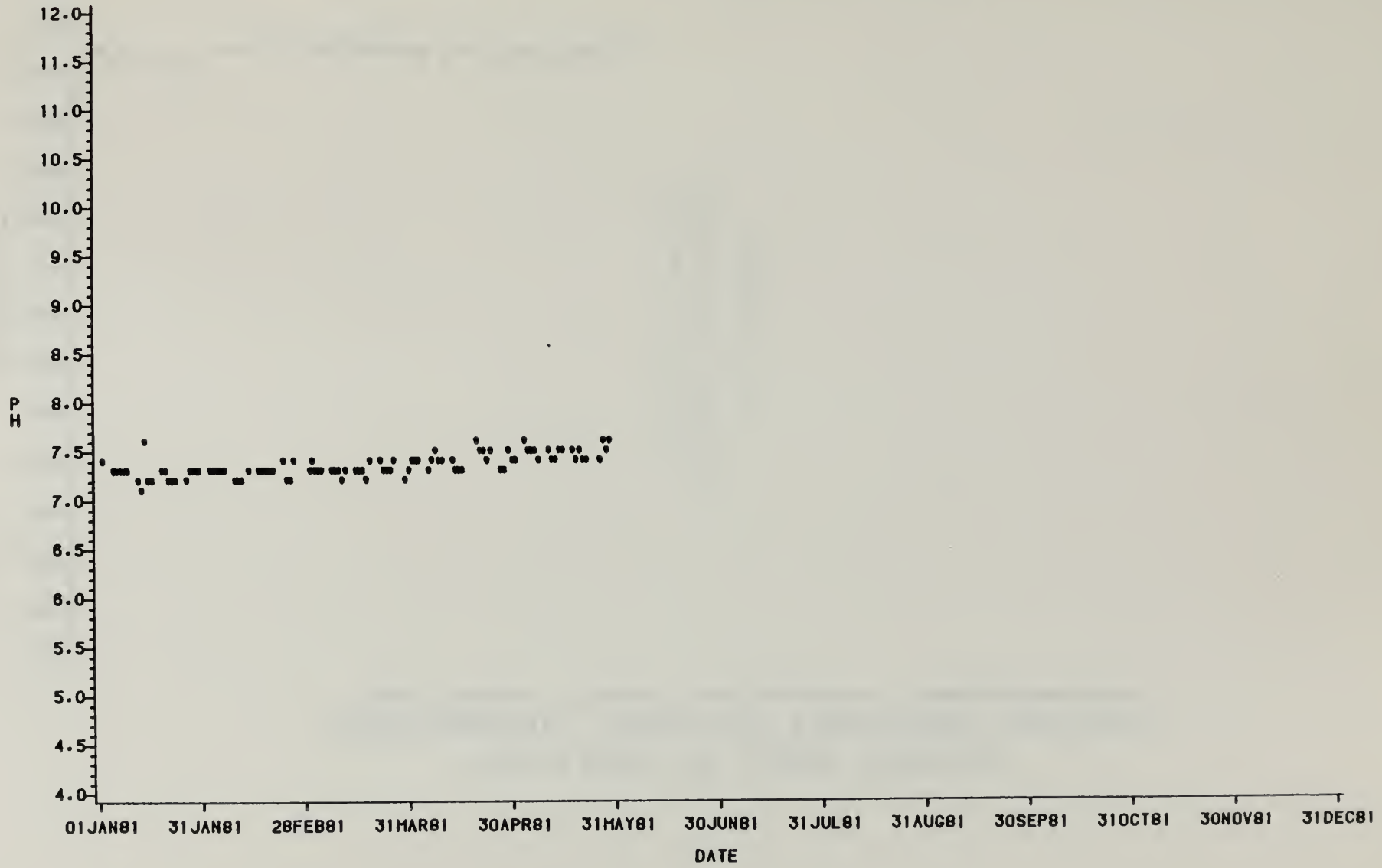
RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM

REPORT YEAR=1981 TYPE=SEEP STATION=SPG-MILL PARAMETER=TEMPERATURE



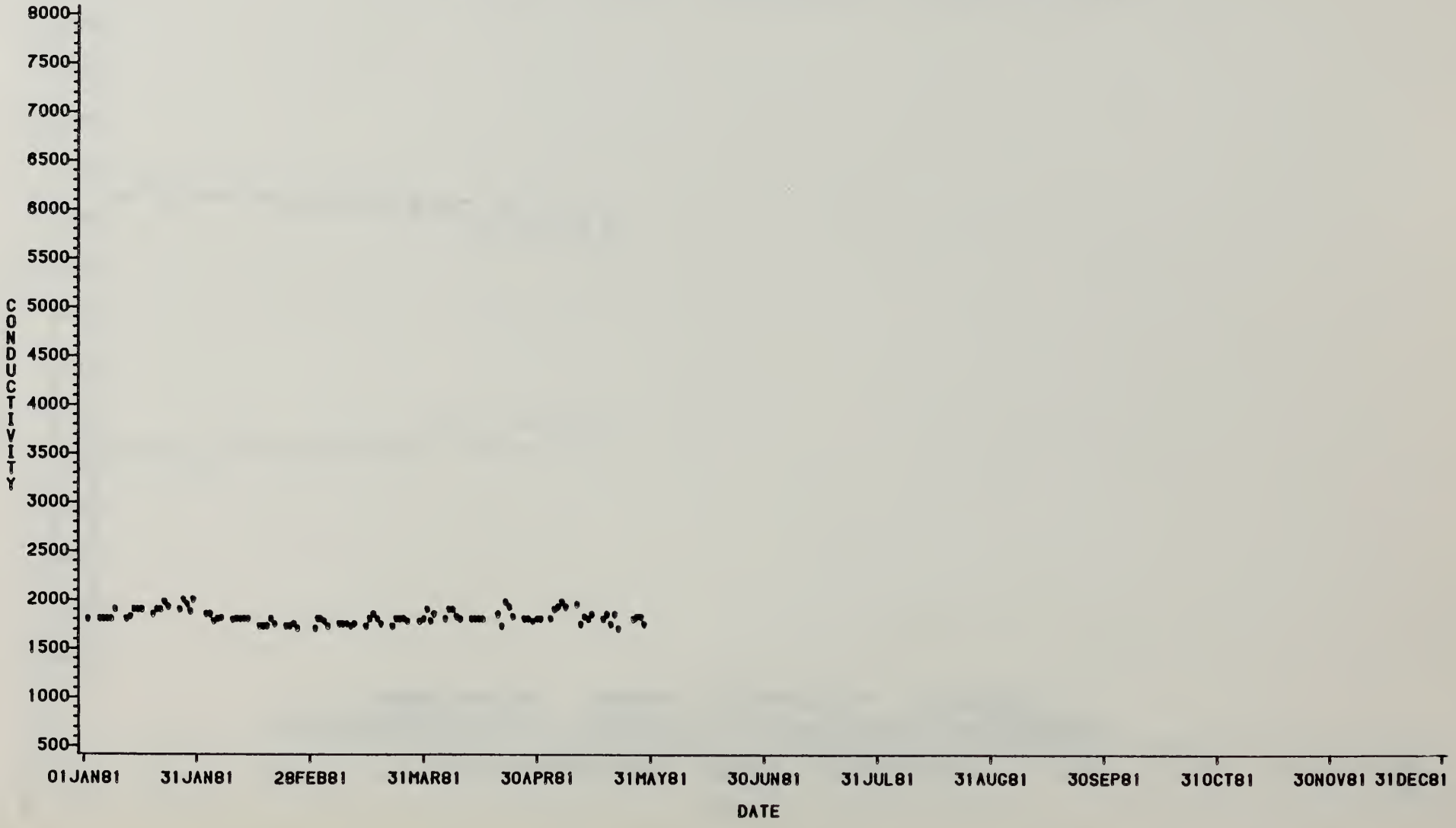
RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM

REPORT YEAR=1981 TYPE=SEEP STATION=SPG-MILL PARAMETER=PH



RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM

REPORT YEAR=1981 TYPE=SEEP STATION=SPG-MILL PARAMETER=CONDUCTIVITY

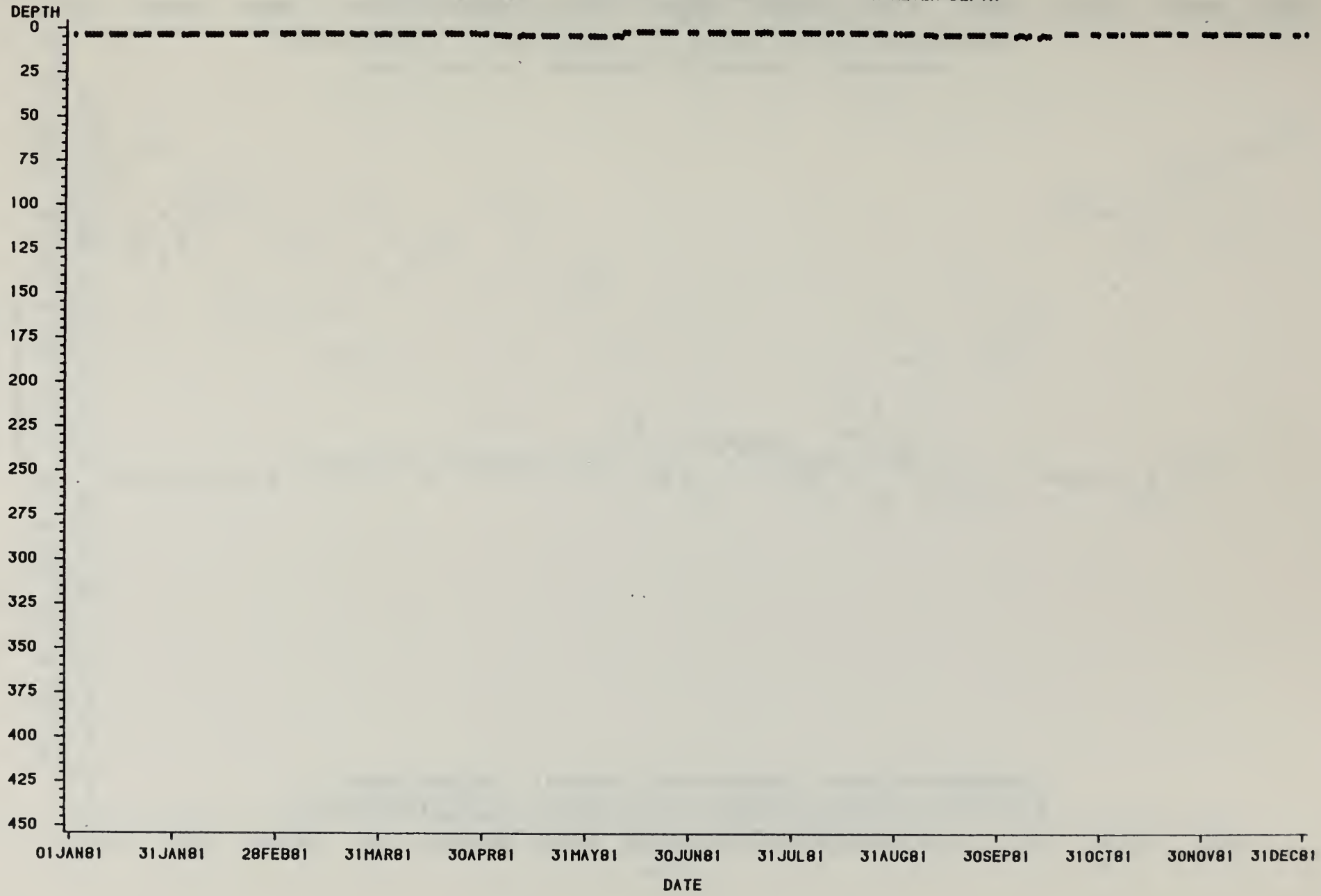


APPENDIX 5-2.4

Stream Station Field Data
MIS Monitoring Program

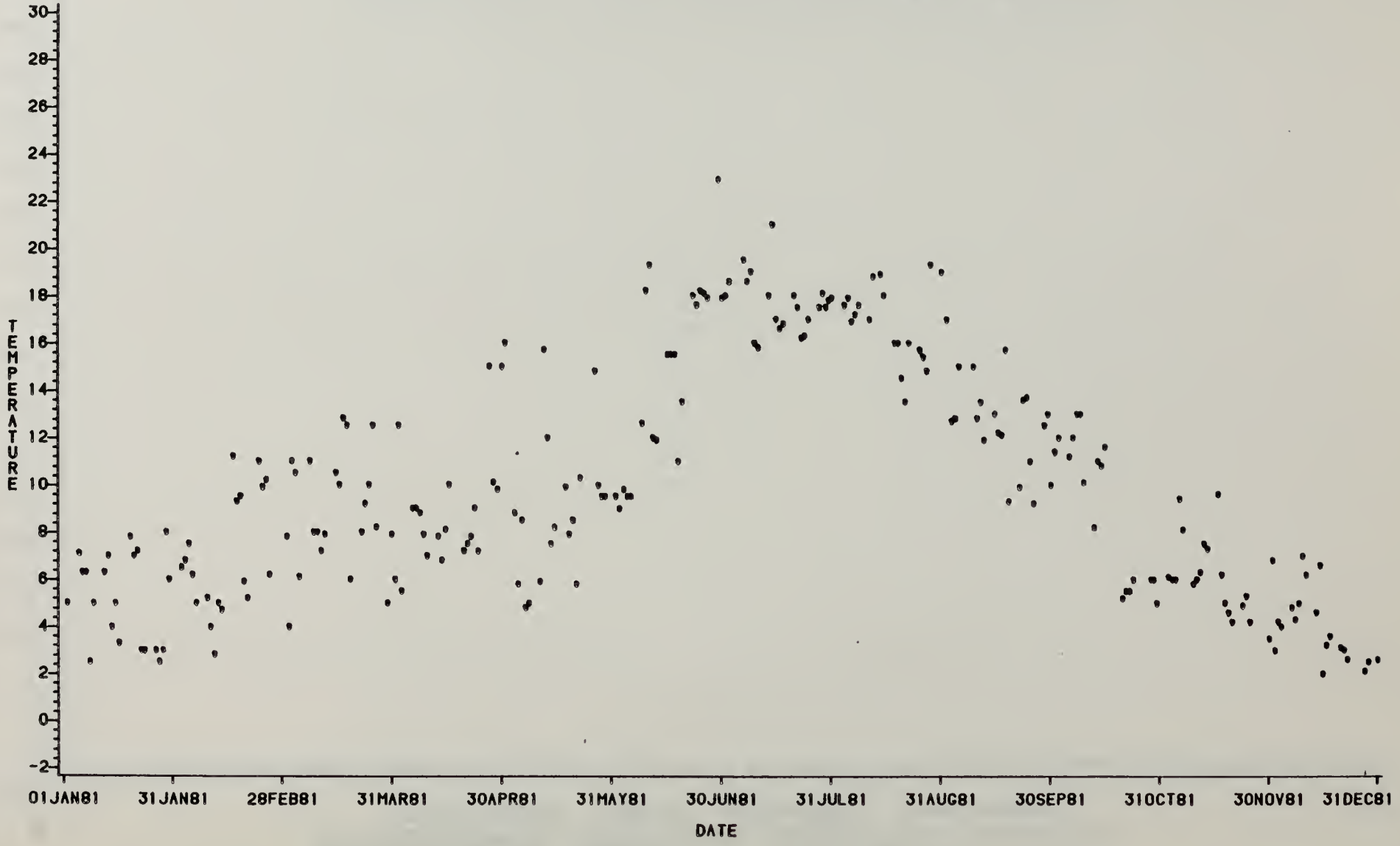
RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM

REPORT YEAR=1981 TYPE=DAMS STATION=YSEOFL PARAMETER=DEPTH



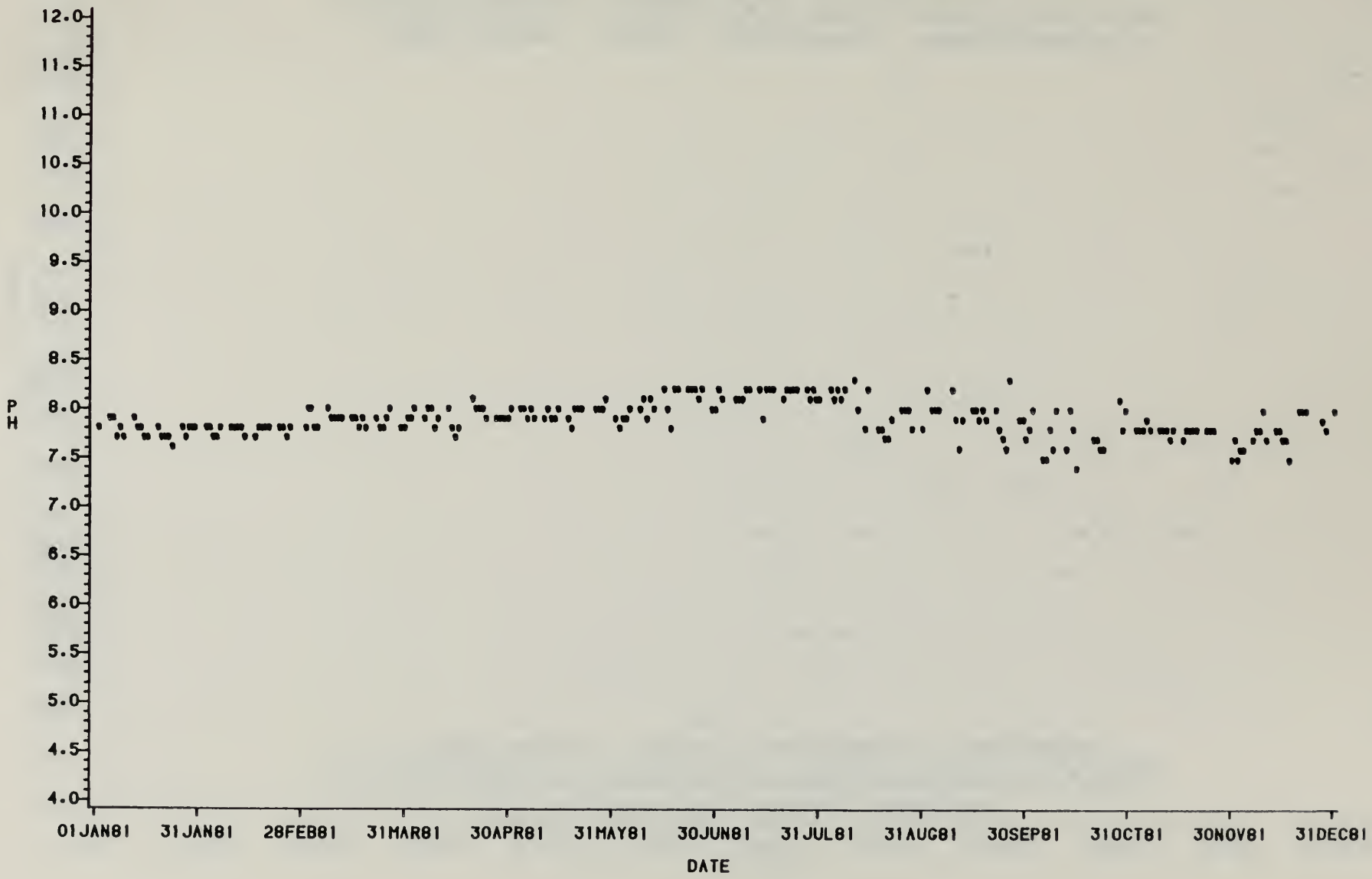
RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM

REPORT YEAR=1981 TYPE=DAMS STATION=YSEOFL PARAMETER=TEMPERATURE



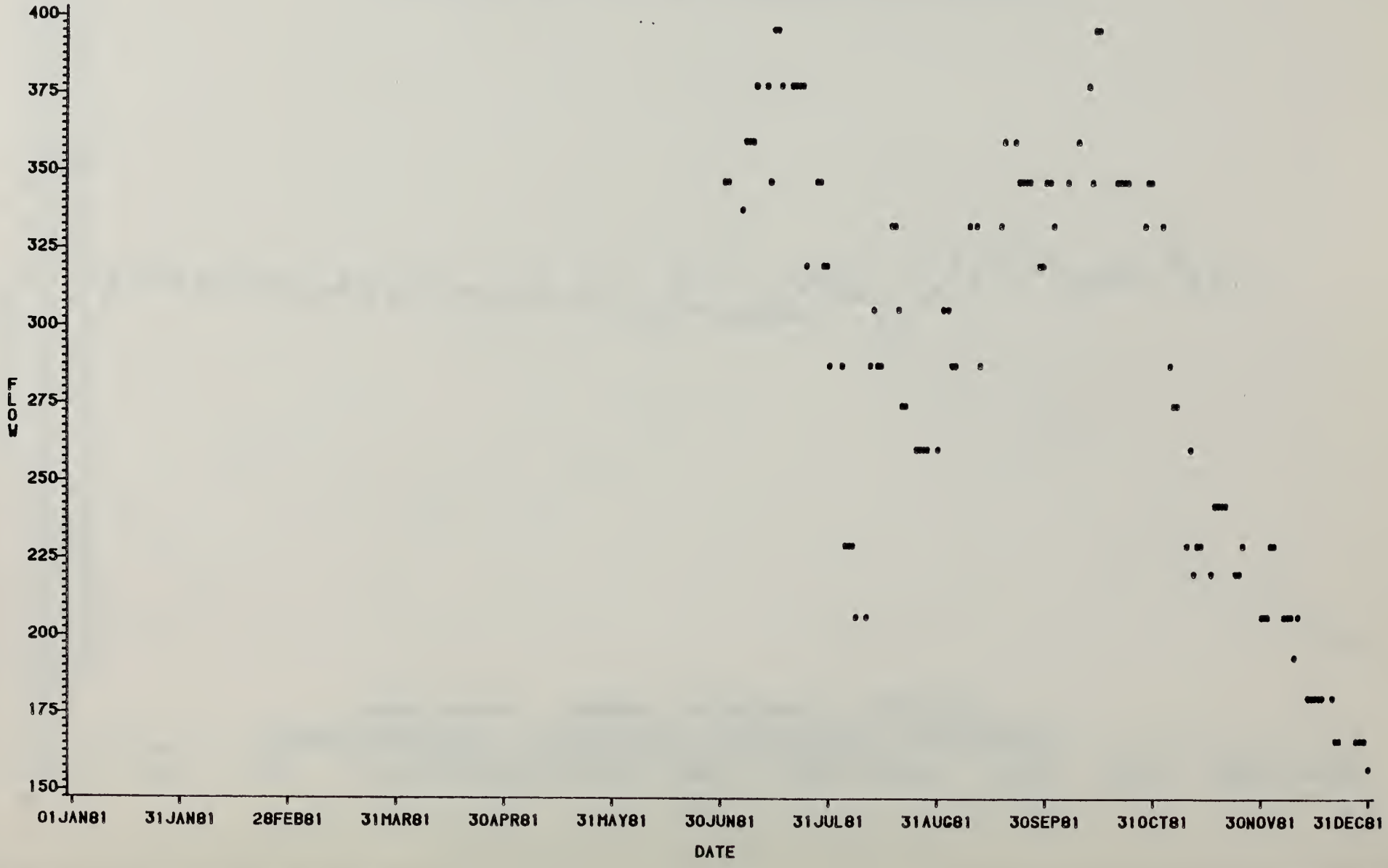
RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM

REPORT YEAR=1981 TYPE=DAMS STATION=YSEOFL PARAMETER=PH



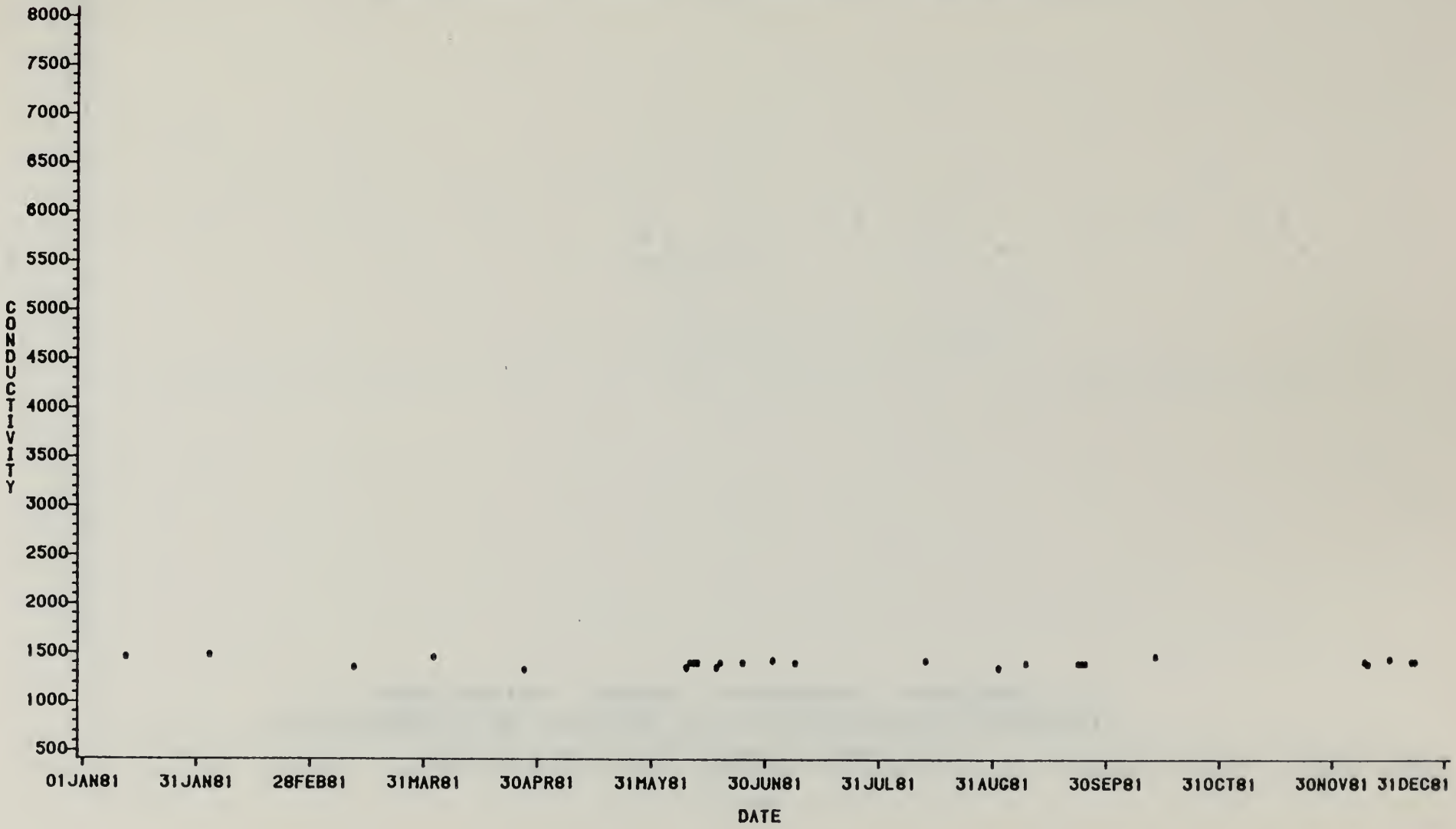
RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM

REPORT YEAR=1981 TYPE=DAMS STATION=YBOXFL PARAMETER=FLOW



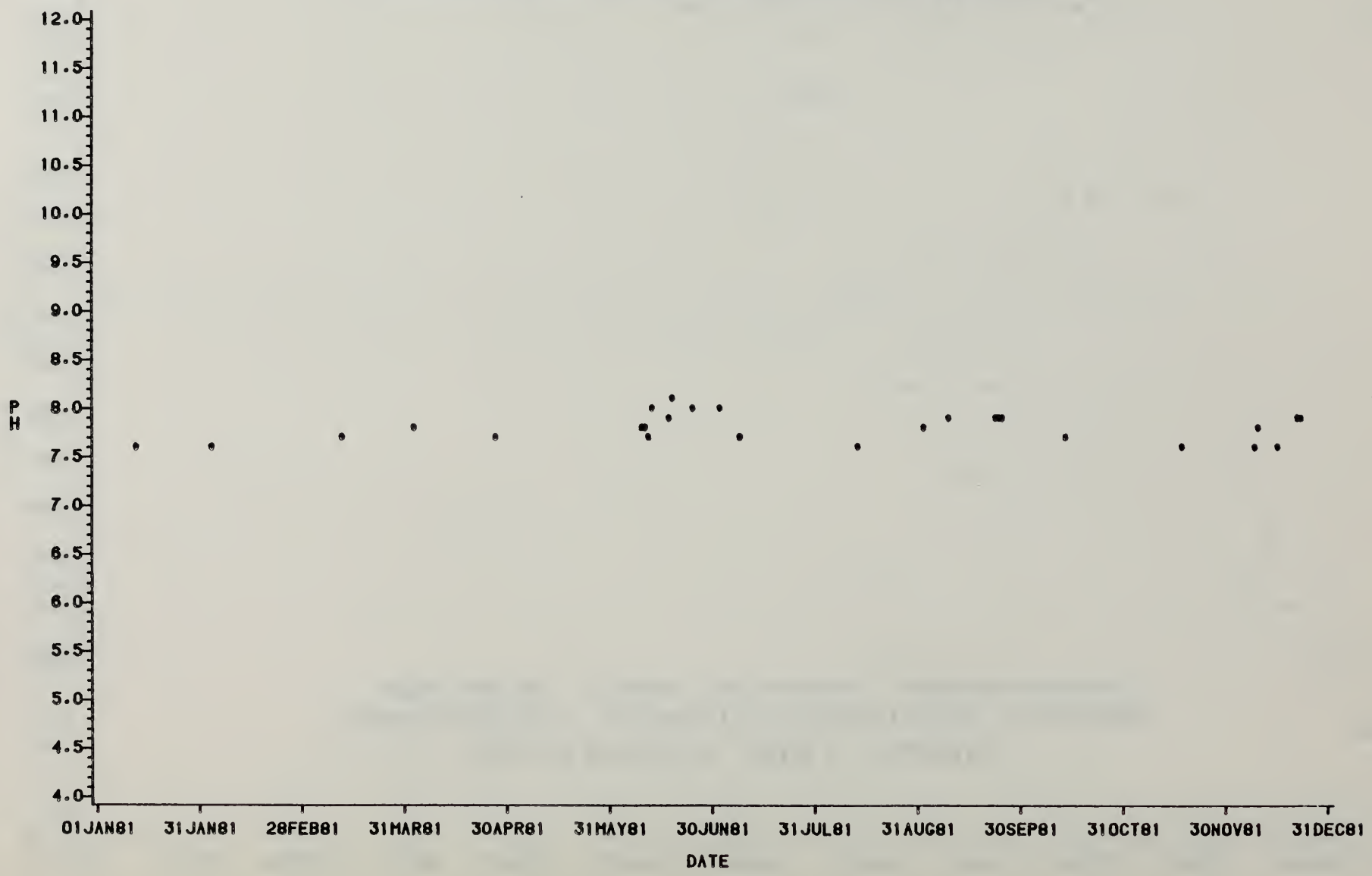
RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM

REPORT YEAR=1981 TYPE=DAMS STATION=YBOXFL PARAMETER=CONDUCTIVITY

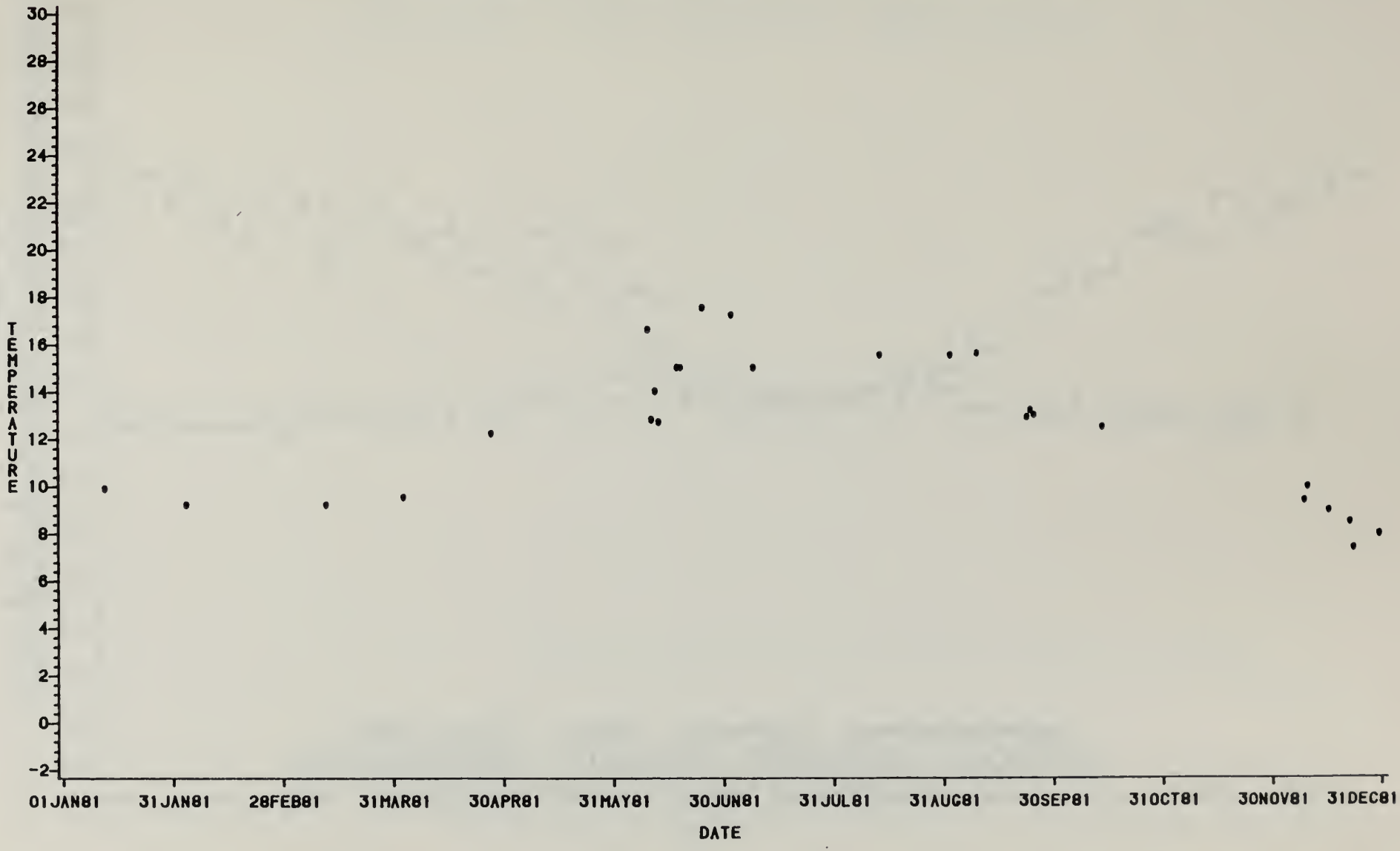


RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM

REPORT YEAR=1981 TYPE=DAMS STATION=YBOXFL PARAMETER=PH

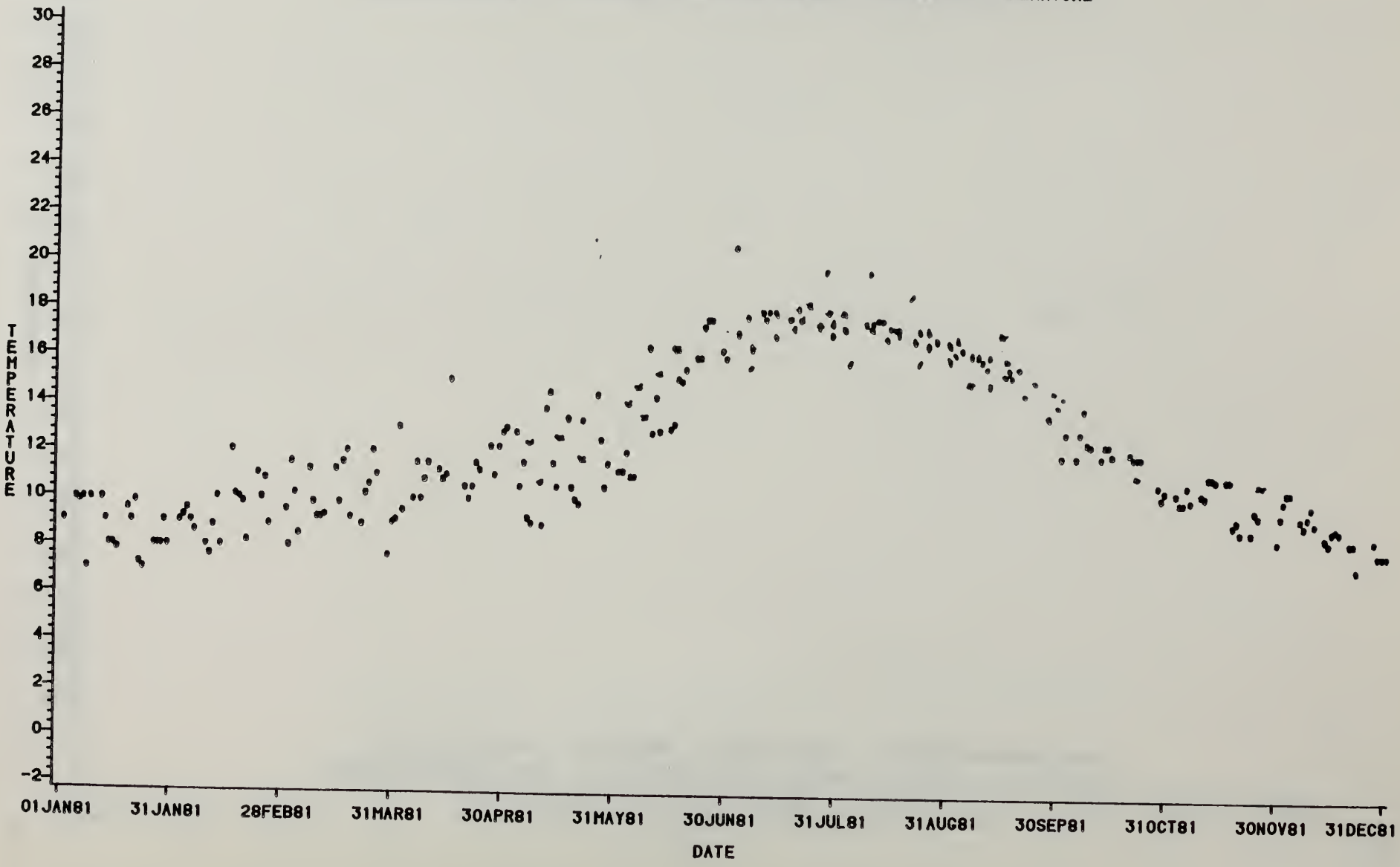


RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM
REPORT YEAR=1981 TYPE=DAMS STATION=YBOXFL PARAMETER=TEMPERATURE



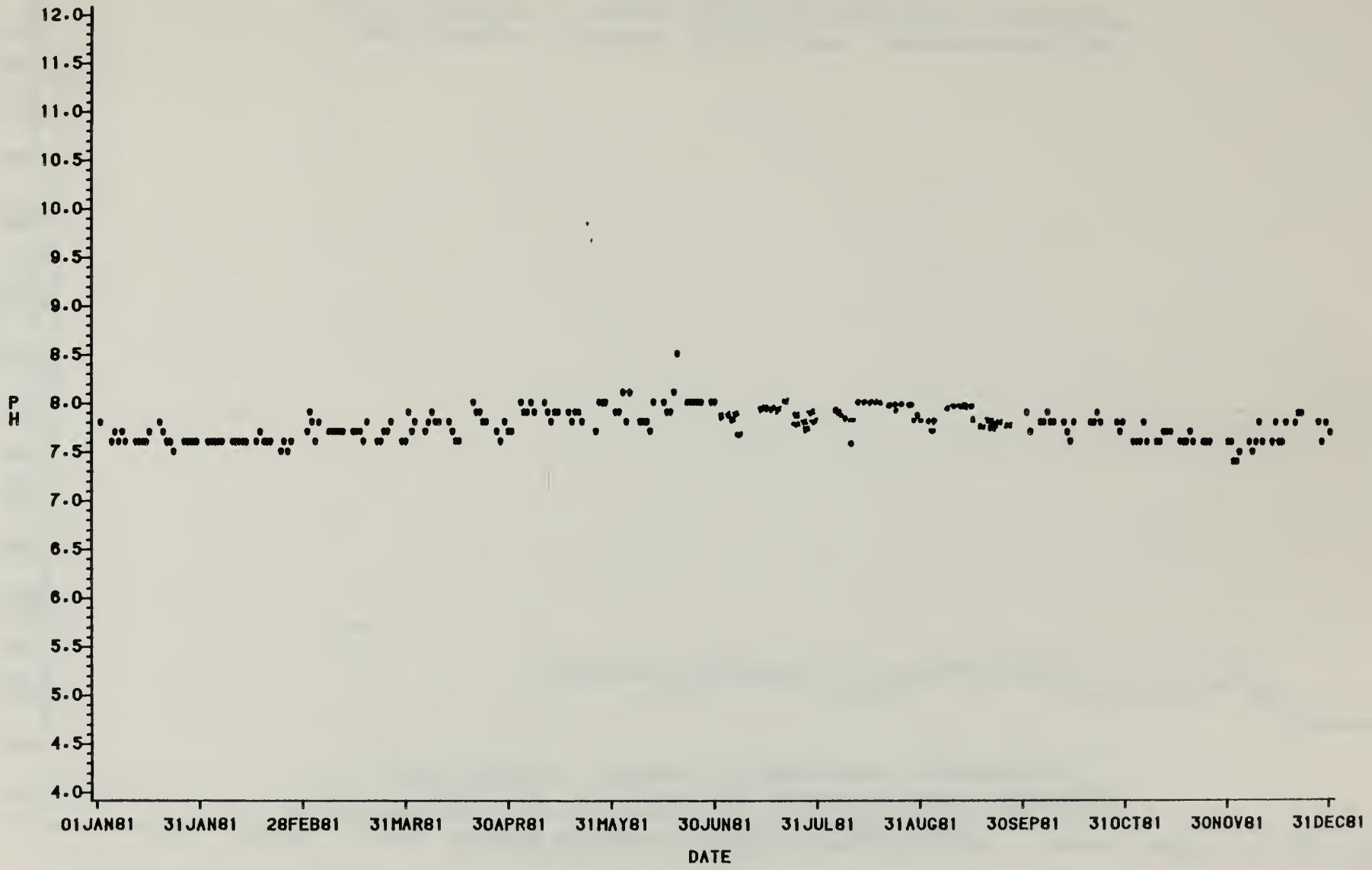
RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM

REPORT YEAR=1981 TYPE=DAMS STATION=YMET3 PARAMETER=TEMPERATURE



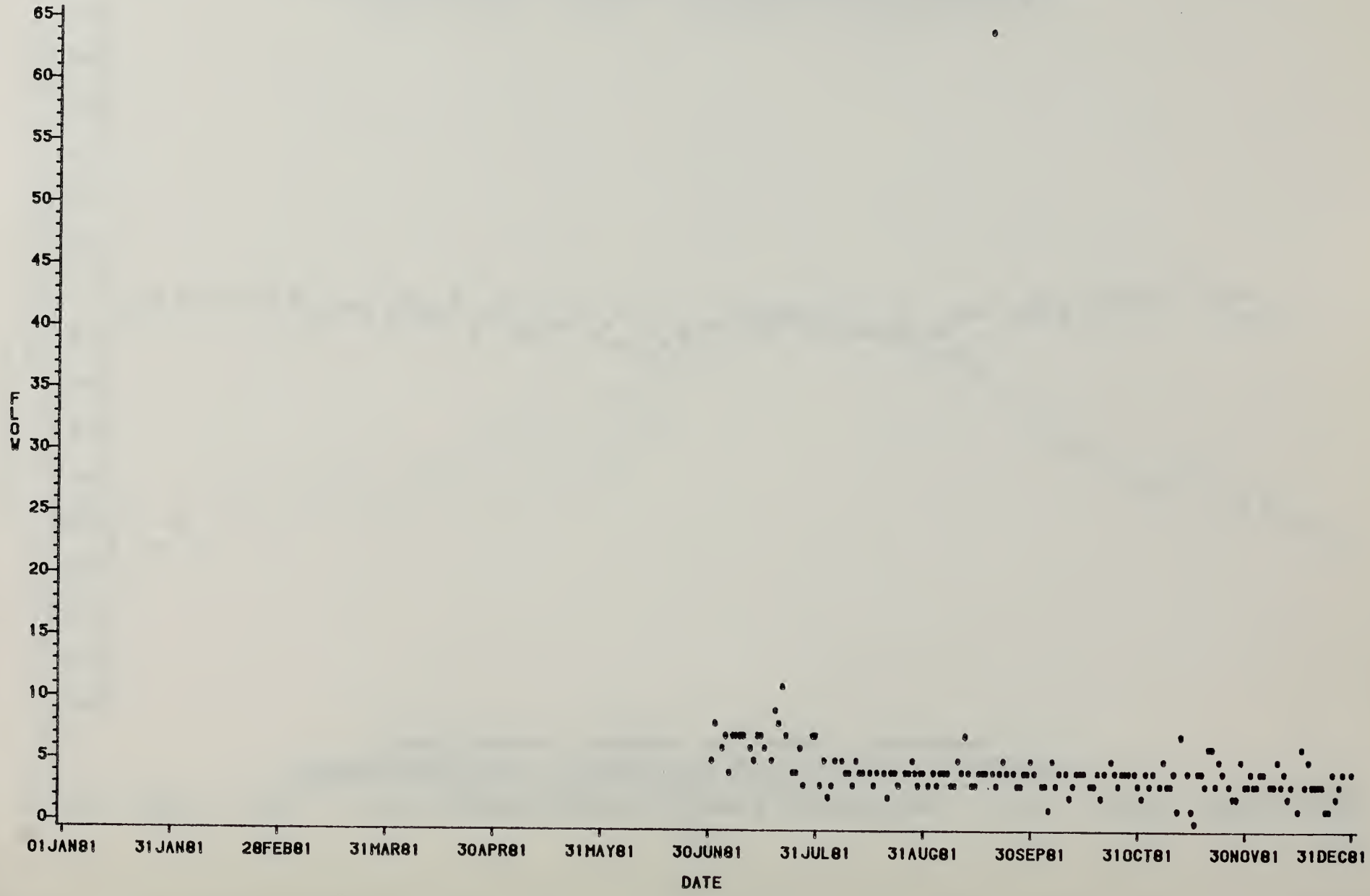
RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM

REPORT YEAR=1981 TYPE=DAMS STATION=YMET3 PARAMETER=PH



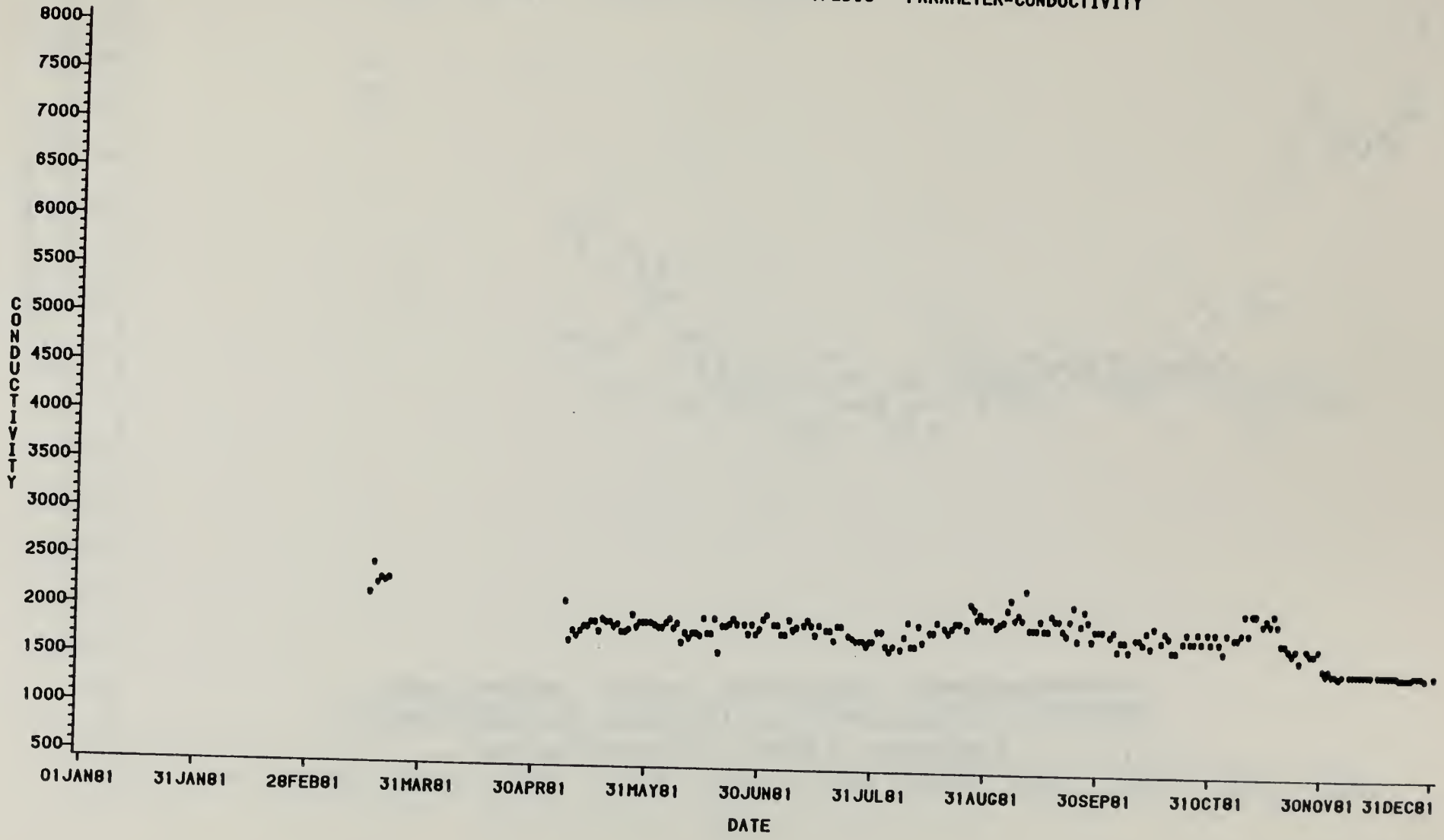
RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM

REPORT YEAR=1981 TYPE=DAMS STATION=YFLDIS PARAMETER=FLOW



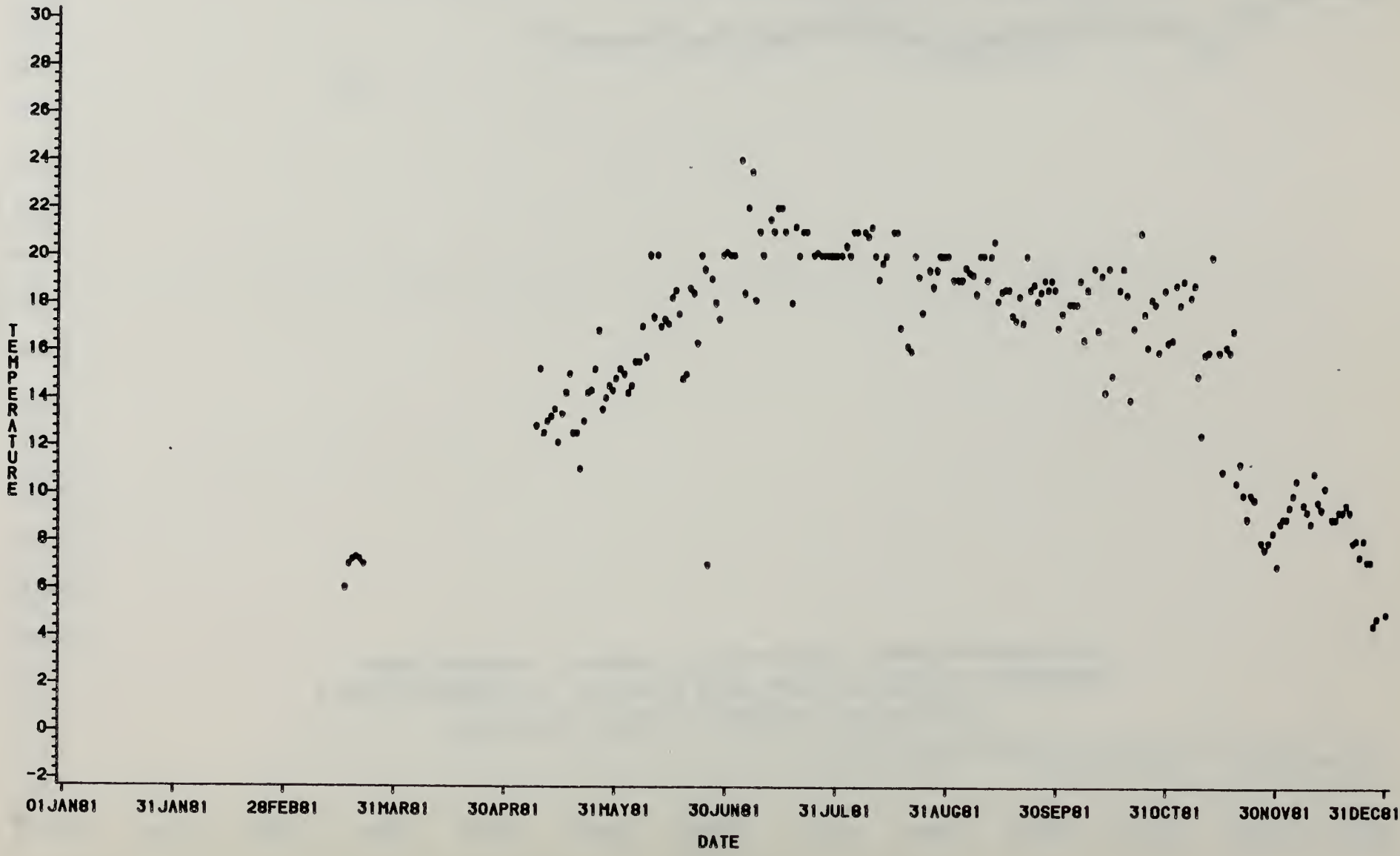
RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM

REPORT YEAR=1981 TYPE=DAMS STATION=YFLDIS PARAMETER=CONDUCTIVITY



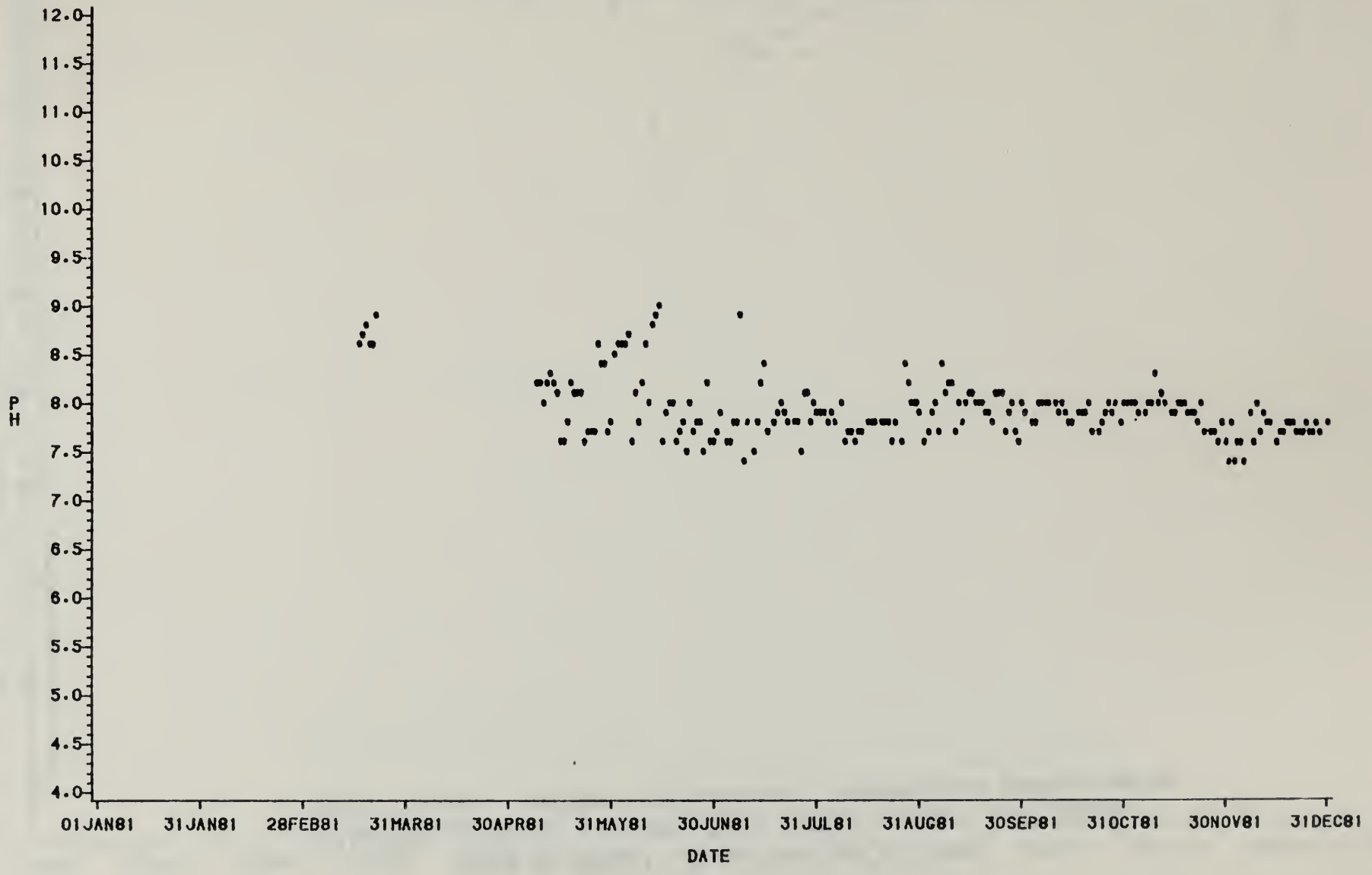
RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM

REPORT YEAR=1981 TYPE=DAMS STATION=YFLDIS PARAMETER=TEMPERATURE



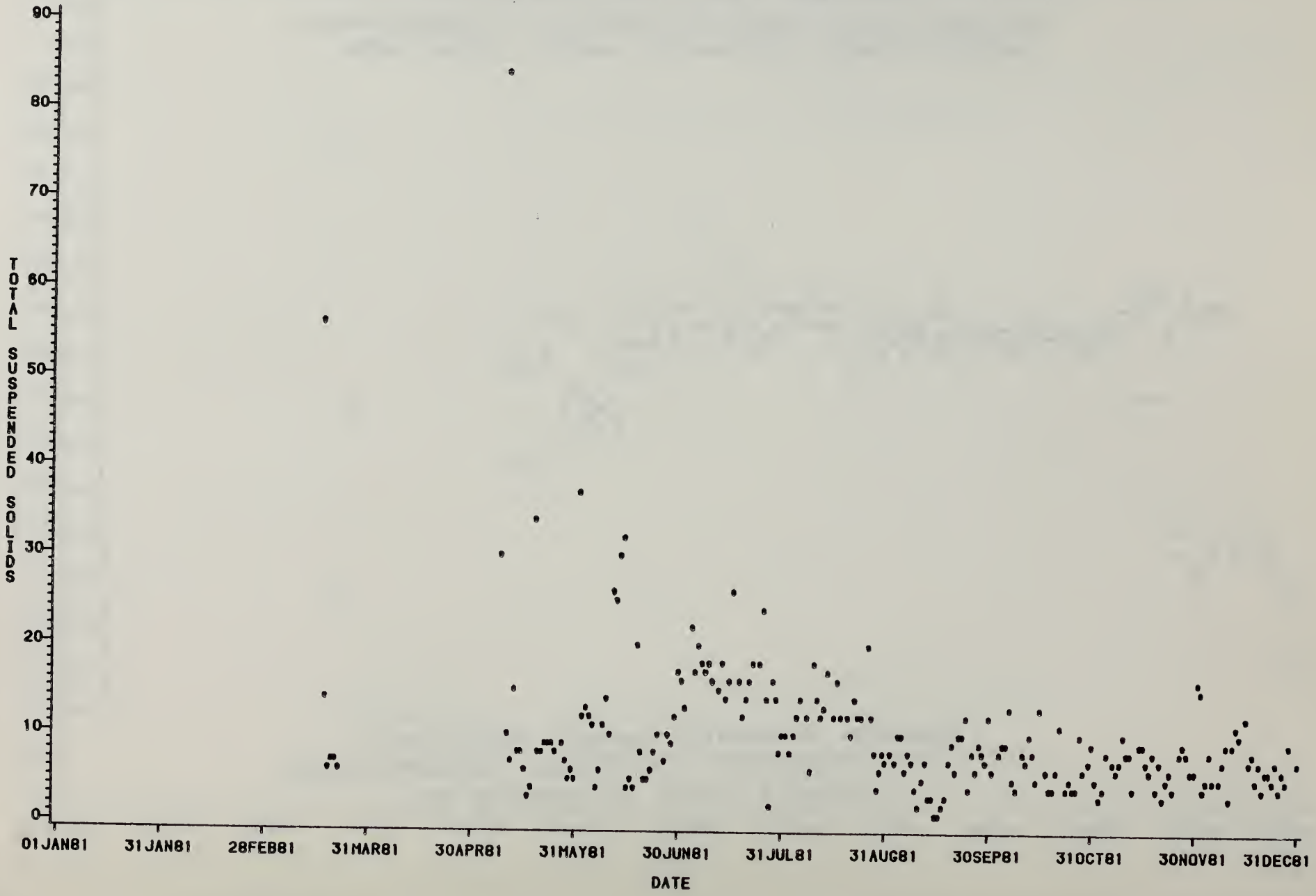
RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM

REPORT YEAR=1981 TYPE=DAMS STATION=YFLDIS PARAMETER=PH



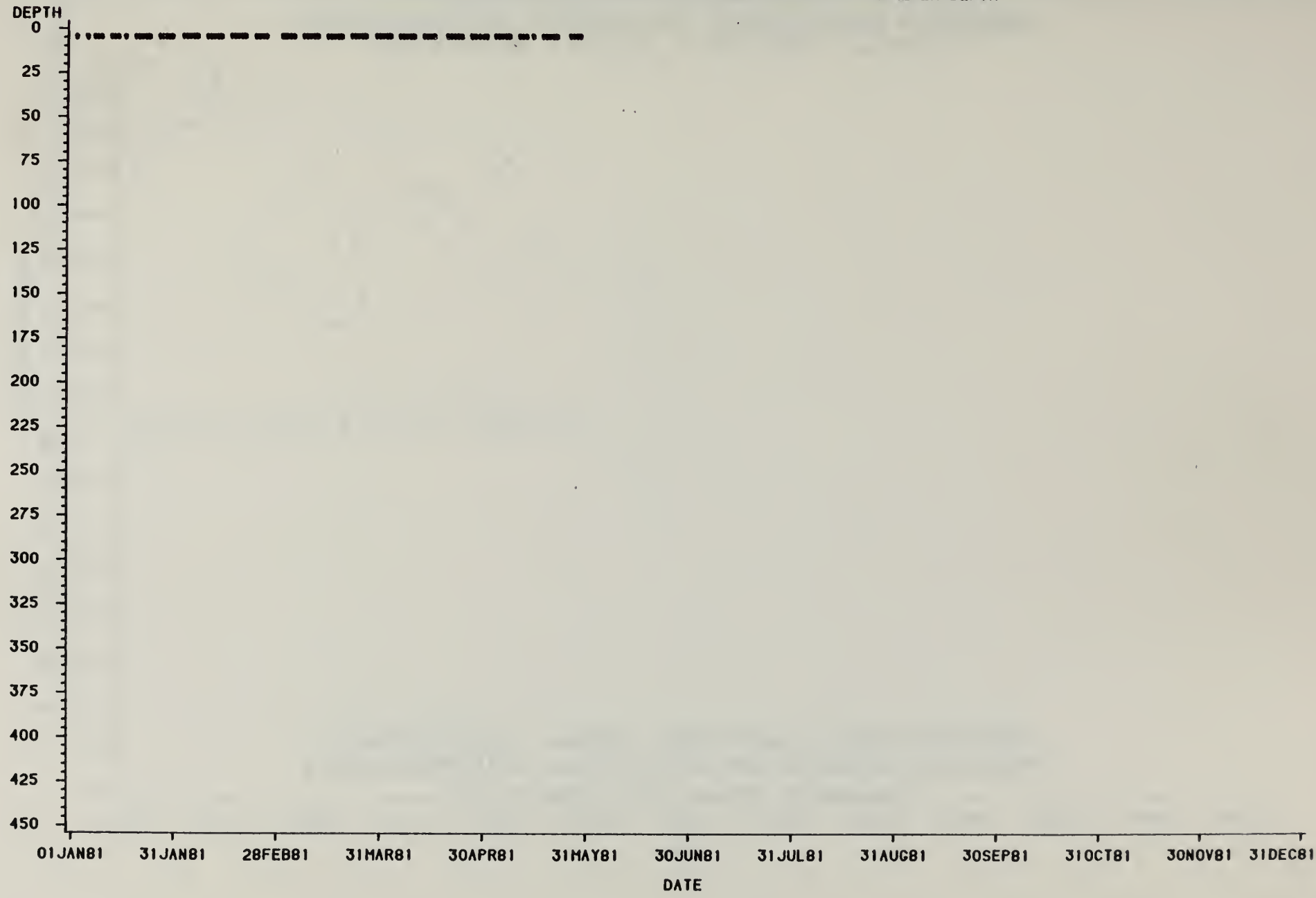
RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM

REPORT YEAR=1981 TYPE=DAMS STATION=YFLDIS PARAMETER=TOTAL SUSPENDED SOLIDS



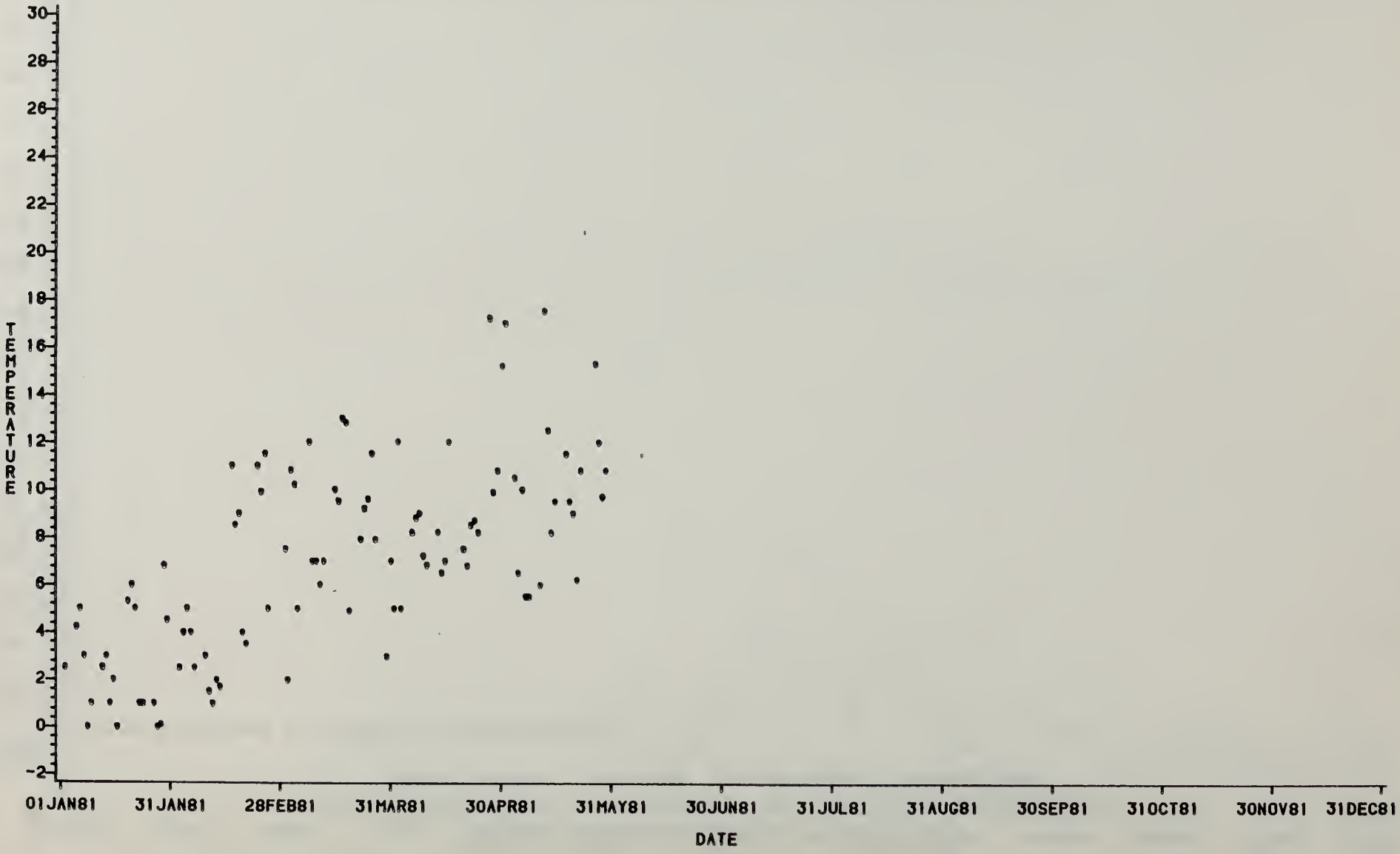
RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM

REPORT YEAR=1981 TYPE=DAMS STATION=Y24RDS PARAMETER=DEPTH

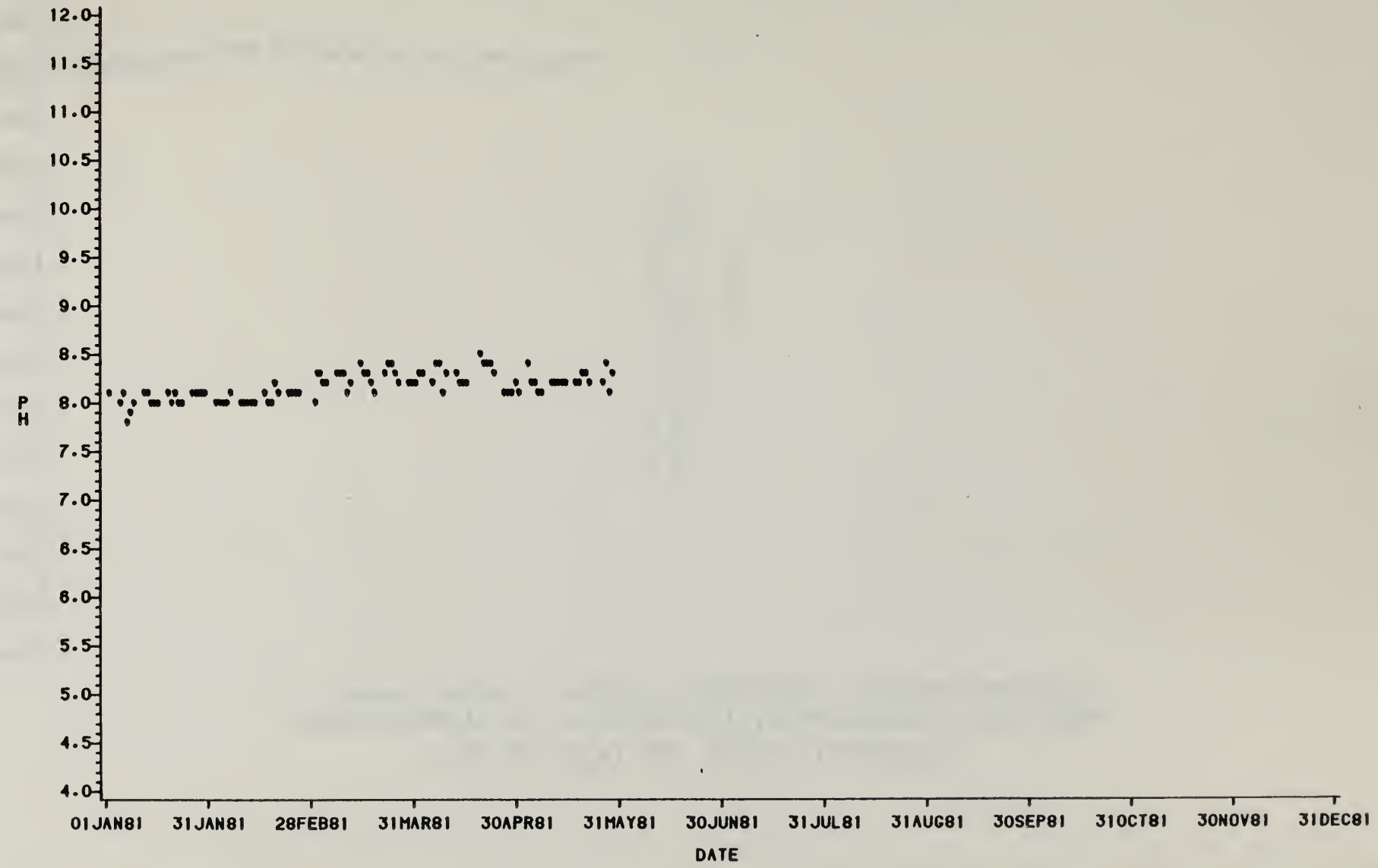


RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM

REPORT YEAR=1981 TYPE=DAMS STATION=Y24RDS PARAMETER=TEMPERATURE

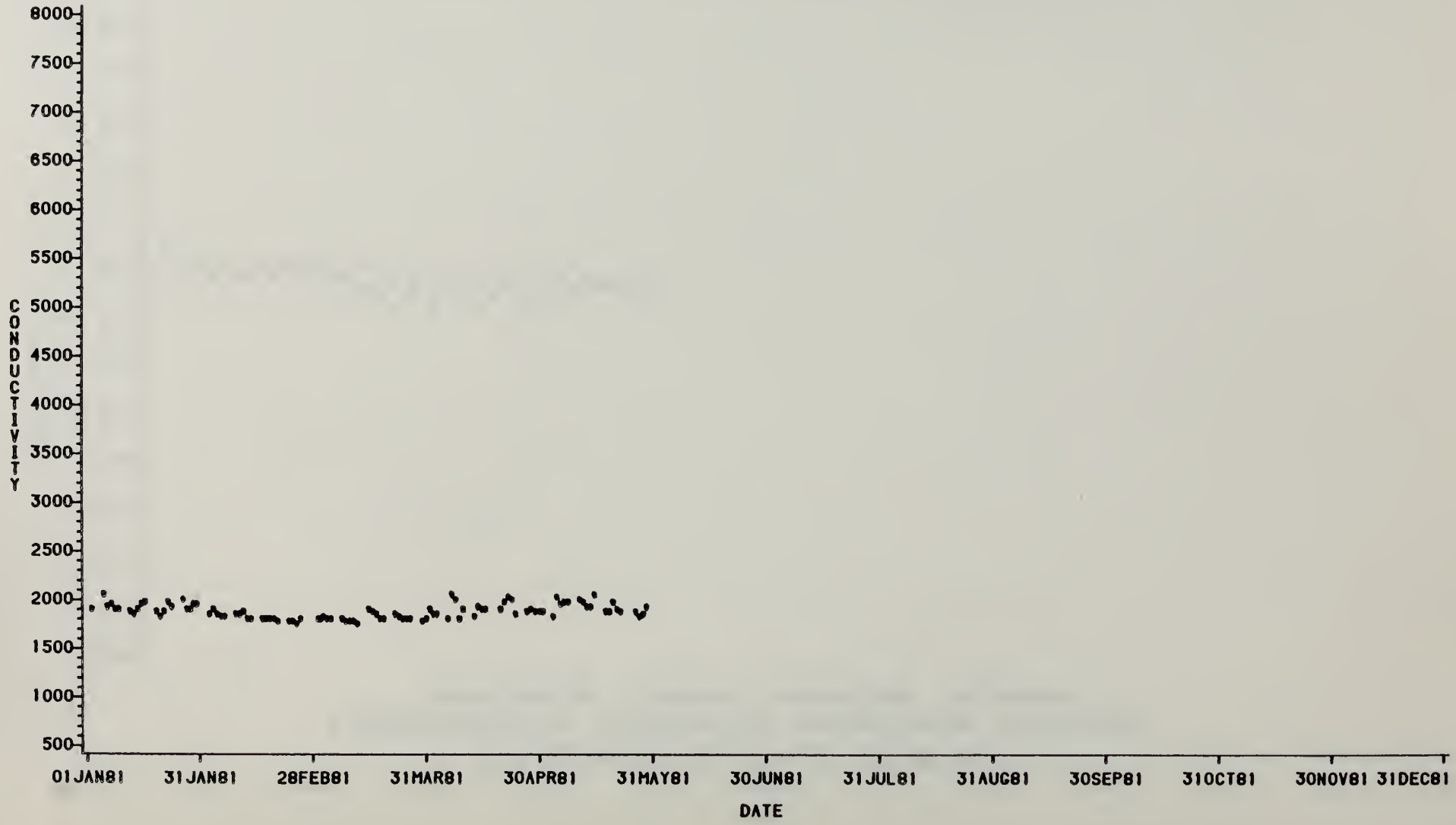


RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM
REPORT YEAR=1981 TYPE=DAMS STATION=Y24RDS PARAMETER=PH



RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM

REPORT YEAR=1981 TYPE=DAMS STATION=Y24RDS PARAMETER=CONDUCTIVITY

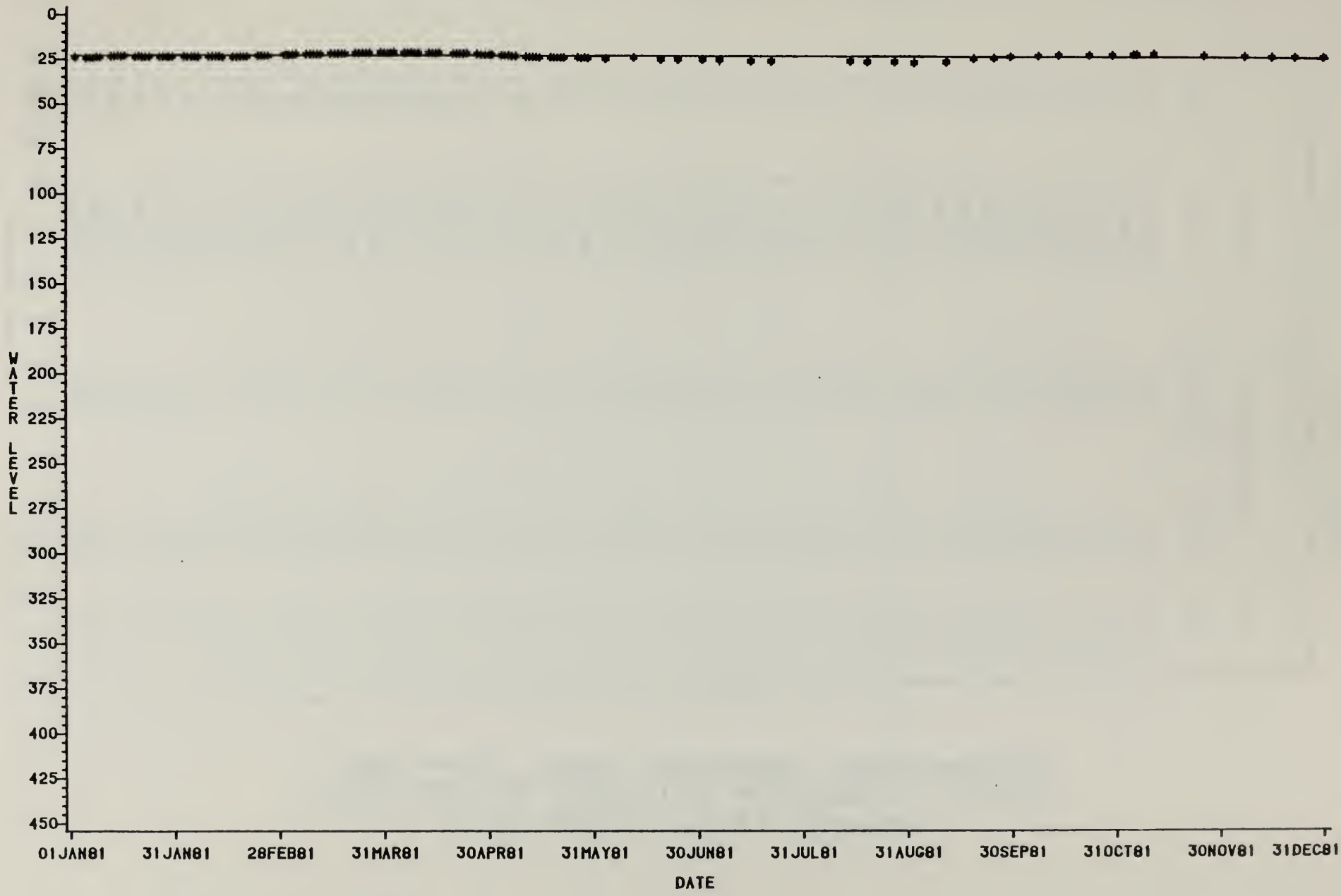


APPENDIX 5-2.5

Alluvial Aquifer Field Data
MIS Monitoring Program

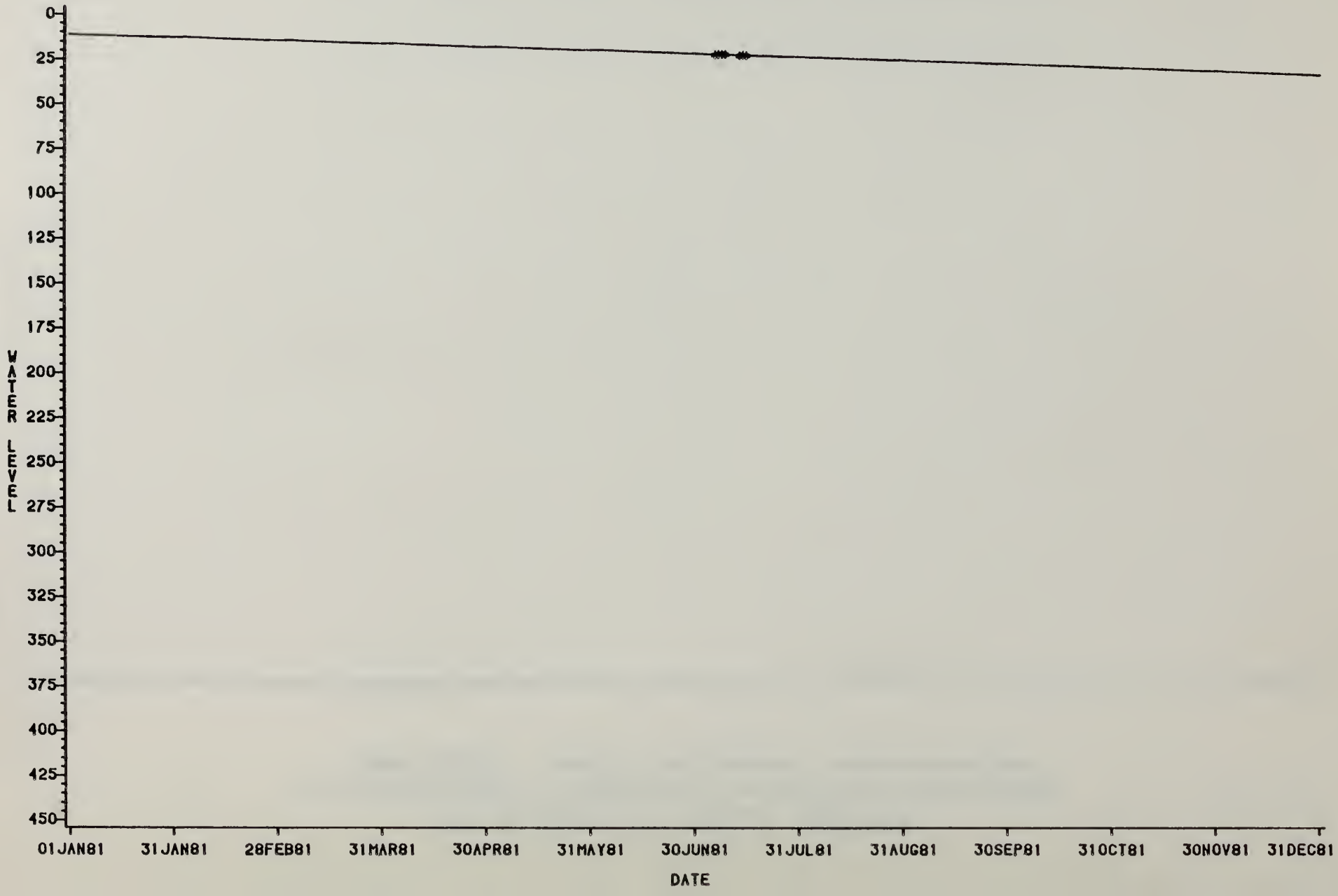
RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM

REPORT YEAR=1981 TYPE=ALUV STATION=GS-S7 PARAMETER=WATER LEVEL



RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM

REPORT YEAR=1981 TYPE=ALUV STATION=GS-S27D PARAMETER=WATER LEVEL



RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM
FIELD DATA - 1981

---------- TYPE=ALUV STATION=GS-S7 ----------

OBS	DATE	SPC_COND	TEMP	PH
118	02JAN81	1100	8.2	7.2
119	09JAN81	1175	9.5	7.3
120	16JAN81	1200	9.6	7.3
121	21JAN81	1225	8.8	7.4
122	29JAN81	1225	8.0	7.5
123	06FEB81	1200	8.0	7.4
124	13FEB81	1200	8.9	7.4
125	19FEB81	1175	8.9	7.4
126	26FEB81	1200	8.0	7.8
127	06MAR81	1125	7.9	7.6
128	13MAR81	1175	8.2	7.6
129	20MAR81	1100	8.8	7.6
130	26MAR81	1125	8.2	7.6
131	31MAR81	1100	7.8	7.7
132	09APR81	1175	8.8	7.7
133	15APR81	1200	9.0	7.4
134	24APR81	1200	8.9	7.6
135	29APR81	1200	8.8	7.7
136	01MAY81	1200	9.0	7.4
137	08MAY81	1225	8.9	7.4
138	15MAY81	1250	9.0	7.4
139	22MAY81	1250	9.5	7.5
140	29MAY81	1250	10.2	7.5
141	03JUN81	1200	9.5	7.8
142	11JUN81	1100	9.2	7.6
143	19JUN81	1100	9.4	7.5
144	24JUN81	1125	9.4	7.6
145	01JUL81	1100	9.9	8.0
146	06JUL81	1075	9.7	8.0
147	15JUL81	1100	9.7	8.0
148	21JUL81	1050	9.4	7.6
149	13AUG81	1150	9.8	7.8
150	18AUG81	1200	8.7	7.3
151	26AUG81	1200	8.5	7.3
152	01SEP81	1125	9.6	7.6
153	10SEP81	1200	9.8	7.5
154	18SEP81	1150	10.5	7.6
155	24SEP81	1175	9.9	7.6
156	29SEP81	1200	8.8	7.7
157	07OCT81	1225	14.2	7.8
158	13OCT81	1200	9.6	7.5
159	22OCT81	1200	9.8	7.7
160	29OCT81	1225	8.9	7.5
161	04NOV81	1250	8.5	7.5
162	05NOV81	1200	8.2	7.5
163	10NOV81	1225	8.8	7.5
164	25NOV81	1125	8.3	7.5

RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM
FIELD DATA - 1981

---------- TYPE=ALUV STATION=GS-S7 ----------

OBS	DATE	SPC_COND	TEMP	PH
165	07DEC81	1200	8.0	7.5
166	15DEC81	1200	8.0	7.6
167	22DEC81	1150	6.6	7.5
168	30DEC81	1200	8.0	7.6

---------- TYPE=ALUV STATION=GS-S8 ----------

OBS	DATE	SPC_COND	TEMP	PH
169	29JAN81	1050	7.0	7.2
170	24FEB81	950	8.5	7.9
171	31MAR81	950	8.0	7.4
172	29APR81	850	9.0	7.7
173	04JUN81	875	10.5	7.7
174	11JUN81	900	10.5	7.8
175	19JUN81	950	10.0	7.8
176	24JUN81	1100	9.8	8.0
177	01JUL81	1000	9.8	7.9
178	06JUL81	1000	9.8	8.0
179	15JUL81	1000	9.8	8.0
180	21JUL81	900	9.8	7.8
181	04AUG81	1050	10.5	7.7
182	06AUG81	1000	9.8	7.9
183	13AUG81	975	9.9	7.5
184	20AUG81	1000	10.0	7.4
185	26AUG81	1100	9.5	7.4
186	01SEP81	1050	12.0	7.9
187	10SEP81	975	9.6	7.6
188	18SEP81	1000	9.9	7.5
189	24SEP81	1000	9.6	7.5
190	29SEP81	950	9.0	7.6
191	07OCT81	1000	9.3	7.7
192	13OCT81	1000	9.8	7.7
193	10NOV81	1000	9.3	7.7
194	25NOV81	875	8.0	7.7

RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM
FIELD DATA - 1981

---------- TYPE=ALUV STATION=GS-S24 ----------

OBS	DATE	SPC_COND	TEMP	PH
33	08JAN81	.	.	0.6
34	30JAN81	1800	8.5	7.5
35	24FEB81	1775	8.0	7.5
36	17JUN81	1800	9.9	7.6
37	06AUG81	1900	10.0	7.4
38	25AUG81	1900	9.9	7.4
39	04NOV81	1900	8.8	7.7
40	22DEC81	1950	8.0	7.6

---------- TYPE=ALUV STATION=GS-S27S ----------

OBS	DATE	SPC_COND	TEMP	PH
41	02JAN81	1410	10.0	7.7
42	09JAN81	1475	9.9	7.5
43	16JAN81	1475	9.9	7.5
44	21JAN81	1500	9.2	7.4
45	29JAN81	1500	8.2	7.4
46	06FEB81	1500	8.5	7.4
47	13FEB81	1500	9.0	7.5
48	19FEB81	1450	9.5	7.3
49	26FEB81	1500	9.0	7.7
50	06MAR81	1500	8.9	7.4
51	13MAR81	1475	8.9	7.5
52	20MAR81	1450	9.0	7.5
53	26MAR81	1475	10.0	7.7
54	31MAR81	1500	9.0	7.6
55	09APR81	1475	10.2	7.6
56	15APR81	1475	8.7	7.5
57	24APR81	1500	9.0	7.7
58	29APR81	1500	9.0	7.6
59	01MAY81	1500	9.1	7.5
60	08MAY81	1500	9.0	7.5
61	15MAY81	1500	9.5	7.5
62	22MAY81	1475	9.3	7.5
63	29MAY81	1510	10.0	7.5
64	11JUN81	1350	11.2	8.0
65	25JUN81	1400	11.0	8.0
66	02JUL81	1475	11.0	7.7
67	03JUL81	1350	10.2	8.0
68	07OCT81	1400	11.5	7.6
69	27OCT81	1500	11.0	7.6
70	10NOV81	1400	8.5	7.5
71	02DEC81	1200	8.5	7.6

APPENDIX 5-2.6

Alluvial Aquifer Water Quality Data
MIS Monitoring Program

RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM
WATER CHEMISTRY DATA - TRACT C-A
ALLUVIAL WATER QUALITY DATA - MIS MONITORING PROGRAM

---------- REPORT YEAR=1981 TYPE=ALUV STATION=GS-S27S ----------

OBS	DATE	TEMP	PH	SPC COND	WALL	AALS	ABAE	BB	BR	BCD	CA	CL	CRU	CF	FE	PB	LI
1	02JUL81	11.0	7.7	1475	.	.	.	.	0.28	.	.	160	13.8	.	0.21	.	.	.
2	11NOV81	8.7	7.7	1500	.	.	.	.	.	.	.	106	14.2	.	0.34	.	.	.

OBS	MG	MN	HG	NI	K	SE	AG	NA	SR	VN	ZB	SI	BA	GE	MOL	SN	TI	WR	HCO3	CO3	OH	SO4	SO3
1	98	.	.	.	1.01	.	.	140	.	.	.	.	.	.	0.1	.	.	.	613	.	.	547	.
2	93	.	1.5	.	1.60	.	.	130	.	.	.	.	.	.	.	.	.	.	598	.	.	424	.

OBS	SS	TSS	TCN	TS04	TDS	ALK	HARD	PO4	NH3	NO2	NO3	TOC	DCN	PHE	OGD	BDD	CDD	SI02	KJE	ORTHOP	ALPHA	BETA
1	.	.	.	.	1289	520	802	0.04	0.04	.	0.2	.	6	.	.	.	.	10	.	.	.	.
2	.	307	.	.	1108	509	647	0.09	0.34	.	0.1	.	4	.	.	.	.	21	.	.	.	.

RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM
WATER CHEMISTRY DATA - TRACT C-A
ALLUVIAL WATER QUALITY DATA - MIS MONITORING PROGRAM

---------- REPORT YEAR=1981 TYPE=ALUV STATION=GS-S7 ----------

OBS	DATE	TEMP	PH	SPC $\bar{C}$OND	WL	AL	AS	AB	EB	B	BR	CD	CA	CL	CR	CU	F	FE	PB	LI	MG
3	29JAN81	8.0	7.5	1225	.	.	.	.	.	0.10	.	.	115	30.9	.	.	0.09	.	.	.	65
4	31MAR81	7.8	7.7	1100	.	.	.	.	.	.	.	.	100	12.3	.	.	0.16	.	.	.	63
5	29APR81	8.8	7.7	1200	.	.	.	.	.	0.43	0.8	.	110	12.3	.	.	0.16	.	.	.	68
6	10NOV81	8.8	7.5	1225	.	.	.	.	.	.	.	.	97	34.6	.	.	0.38	.	.	.	65

OBS	MN	HG	NI	K	SE	AG	NA	SR	V	ZN	SB	BI	AG	EG	MOL	SN	TI	WR	HCO3	CO3	OH	SO4	SO3	S	TSS
3	.	.	.	1.14	.	.	100	.	.	.	.	.	.	.	.	.	.	.	469	.	.	305	.	.	.
4	.	.	.	1.10	.	.	98	.	.	.	.	.	.	.	.	.	.	.	452	.	.	363	.	.	.
5	.	1.0	.	1.20	.	.	97	1.27	.	.	.	.	.	.	.	.	.	.	453	.	.	391	.	0.2	.
6	.	1.4	.	1.12	.	.	95	.	.	.	.	.	.	.	.	.	.	.	464	.	.	294	.	.	39

OBS	TCN	TSO4	TDS	ALK	HARD	PO4	NH3	NO2	NO3	TOC	DOC	CN	PHE	OGD	BOD	CCD	SI2	KJEL	ORTHP	ALPHA	BET A
3	.	.	768	406	555	0.08	.	4.000	1.1	.	6	.	.	.	.	.	20	.	.	.	.
4	.	.	884	389	509	0.05	0.10	0.007	1.0	.	20	.	.	.	.	.	21	.	.	.	.
5	.	.	836	386	554	0.01	0.26	0.002	.	.	2	.	0.01	.	.	23	18	.	.	0	2
6	.	.	901	399	509	0.07	0.24	.	0.9	.	15	.	.	.	.	.	22	.	.	.	.

RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM
WATER CHEMISTRY DATA - TRACT C-A
ALLUVIAL WATER QUALITY DATA - MIS MONITORING PROGRAM

---------- REPORT YEAR=1981 TYPE=ALUV STATION=GS-S8 ----------

OBS	DATE	TEMP	PH	SPC_COND	WALL	AALS	ABAE	B B	B	BR	CD	CA	CL	CR	CU	F	FE	PB	LI
7	29JAN81	7	7.2	1050	.	.	.	.	.	0.16	.	.	93	9.47	.	.	0.08	.	.	.
8	31MAR81	8	7.4	1075	.	.	.	.	.	.	.	.	100	11.80	.	.	0.16	.	.	.
9	29APR81	9	7.7	850	.	.	.	.	.	0.81	0.7	.	110	12.90	.	.	0.14	.	.	0.02

OBS	MG	MN	HG	NI	K	SE	AG	AN A	SR	V	ZN	SB	BI	AG	EL	MO	NI	TI	WR	ZR	HCO3	CO3	H	SO4	SO3	S
7	54	.	.	.	0.99	.	.	81	.	.	.	.	.	.	.	.	.	.	.	.	443	.	.	232	.	.
8	55	.	.	.	1.06	.	.	77	.	.	.	.	.	.	.	.	.	.	.	.	427	.	.	307	.	.
9	59	.	0.8	.	1.10	.	.	77	1.04	.	0.01	.	.	.	.	.	.	.	.	.	441	.	.	275	.	1

OBS	TSS	TSN	TS04	TDS	TALK	HARD	PO4	NH3	NO2	NO3	TOC	DOC	PHE	OG	BOD	COD	SI02	KJEL	ORTHP	ALPHA	BETA
7	.	.	.	756	384	454	0.04	.	14.000	1.0	.	8	.	.	.	.	.	21	.	.	.	.
8	.	.	.	772	367	476	0.10	.	0.005	0.9	.	7	.	.	.	.	.	23	.	.	.	.
9	.	.	.	728	381	517	0.02	0.15	0.032	0.5	.	4	.	0.01	.	.	12	20	.	.	0	2

APPENDIX 5-2.7

Multivariate Analysis of Variance (MANOVA)
Variance Test Results for
Alluvial Water Quality

RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM
MULTIVARIATE ANALYSIS OF VARIANCE - WATER CHEMISTRY DATA
MODIFIED INSITU DEVELOPMENT SYSTEM
TYPE=ALUV

GENERAL LINEAR MODELS PROCEDURE

MANOVA TEST CRITERIA FOR THE HYPOTHESIS OF NO OVERALL RPTYR EFFECT

H = TYPE I SS&CP MATRIX FOR: RPTYR
E = ERROR SS&CP MATRIX
P = DEP. VARIABLES = 11
Q = HYPOTHESIS DF = 6
NE= DF OF E = 71
S = MIN(P,Q) = 6
M = .5(ABS(P-Q)-1) = 2.0
N = .5(NE-P-1) = 29.5

HOTELLING-LAWLEY TRACE = TR(E**-1*H) = 9.70975563

F APPROXIMATION = 2(S*N+1)*TR(E**-1*H)/(S*S*(2M+S+1))
WITH S(2M+S+1) AND 2(S*N+1) DF

F(66,356) = 8.73 PROB > F = 0.0001

PILLAI'S TRACE V = TR(H*INV(H+E)) = 2.56930011

F APPROXIMATION = (2N+S+1)/(2M+S+1) * V/(S-V)
WITH S(2M+S+1) AND S(2N+S+1) DF

F(66,396) = 4.43 PROB > F = 0.0001

WILKS' CRITERION L = DET(E)/DET(H+E) = 0.01238410

W = -(NE-.5(P-Q+1))*LN(L) = 298.6113
U = NE-.5(P-Q+1) = 68.0000
Z = SQRT((P*P*Q*Q-4)/(P*P+Q*Q-5)) = 5.3508
B = (P*Q-2)/4 = 16.0000

F APPROXIMATION = (U*Z-2B)/(P*Q)*(1-L**1/Z)/L**1/Z
WITH P*Q AND U*Z-2B DF

F(66,331) = 6.40 PROB > F = 0.0001

RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM
MULTIVARIATE ANALYSIS OF VARIANCE - WATER CHEMISTRY DATA
MODIFIED INSITU DEVELOPMENT SYSTEM
TYPE=ALUV

GENERAL LINEAR MODELS PROCEDURE

MANOVA TEST CRITERIA FOR THE HYPOTHESIS OF NO OVERALL PRTYR EFFECT

ROY'S MAXIMUM ROOT CRITERION = F.74883353

FIRST CANONICAL VARIABLE YIELDS AN F UPPER BOUND

F(6,71) = 68.03 (UPPER BOUND)

RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM
MULTIVARIATE ANALYSIS OF VARIANCE - WATER CHEMISTRY DATA
MODIFIED INSITU DEVELOPMENT SYSTEM
TYPE=ALUV

GENERAL LINEAR MODELS PROCEDURE

MANOVA TEST CRITERIA FOR THE HYPOTHESIS OF NO OVERALL AREA EFFECT

H = TYPE I SS&CP MATRIX FOR: AREA
E = ERROR SS&CP MATRIX
P = DEP. VARIABLES = 11
Q = HYPOTHESIS DF = 2
NE= DF OF E = 71
S = MIN(P,Q) = 2
M = .5(ABS(P-Q)-1) = 4.0
N = .5(NE-P-1) = 29.5

HOTELLING-LAWLEY TRACE = TR(E**-1*H) = 17.47197651

F APPROXIMATION = 2(S*N+1)*TR(E**-1*H)/(S*S*(2M+S+1))
WITH S(2M+S+1) AND 2(S*N+1) DF

F(22,120) = 47.65 PROB > F = 0.0001

PILLAI'S TRACE V = TR(H*INV(H+E)) = 1.35736448

F APPROXIMATION = (2N+S+1)/(2M+S+1) * V/(S-V)
WITH S(2M+S+1) AND S(2N+S+1) DF

F(22,124) = 11.91 PROB > F = 0.0001

WILKS' CRITERION L = DET(E)/DET(H+E) = 0.03300310

EXACT F = (1-SQRT(L))/SQRT(L)*(NE+Q-P-1)/P
WITH 2P AND 2(NE+Q-P-1) DF

F(22,122) = 24.98 PROB > F = 0.0001

ROY'S MAXIMUM ROOT CRITERION = 16.76651005

FIRST CANONICAL VARIABLE YIELDS AN F UPPER BOUND

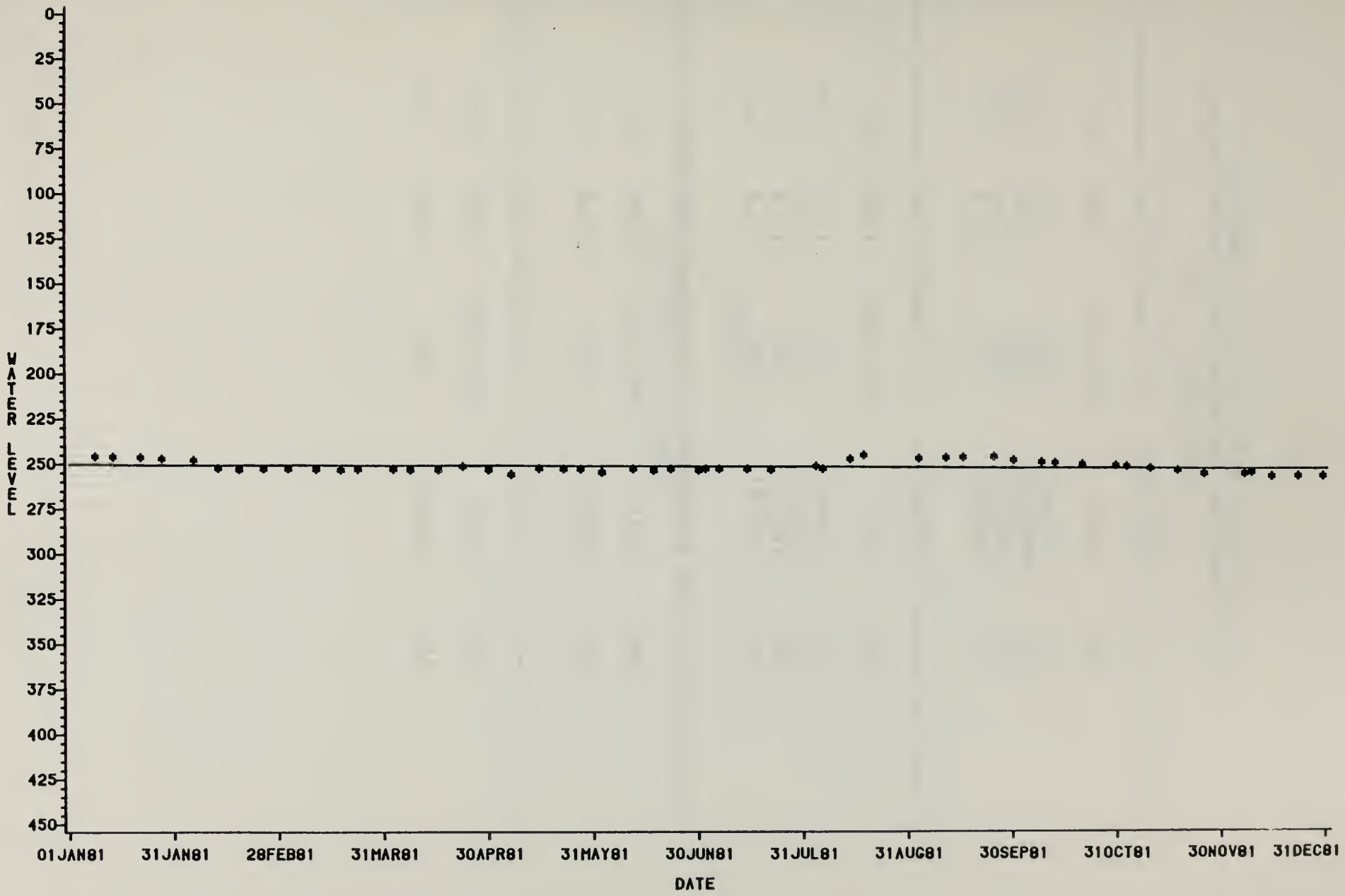
F(?,71) = 595.21 (UPPER BOUND)

APPENDIX 5-2.8

Upper Aquifer Field Data
MIS Monitoring Program

RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM

REPORT YEAR=1981 TYPE=UPPA STATION=CE-709U PARAMETER=WATER LEVEL



RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM
FIELD DATA - 1981

---------- TYPE=UPPA STATION=CE-709U ----------

OBS	DATE	SPC_COND	TEMP	PH
210	30JUN81	1450	11.9	7.1
211	05AUG81	1850	11.6	6.9
212	09DEC81	1750	10.5	7.4
213	23DEC81	1750	10.5	7.4

---------- TYPE=UPPA STATION=CE-705AU ----------

OBS	DATE	SPC_COND	TEMP	PH
202	30JUN81	1350	12.7	7.4
203	05AUG81	1325	12.7	7.7
204	11NOV81	1150	12.4	8.1
205	22DEC81	1200	12.5	8.1

---------- TYPE=UPPA STATION=GS-15U ----------

OBS	DATE	SPC_COND	TEMP	PH
240	11NOV81	2400	10.8	7.6

---------- TYPE=LOWA STATION=GS-15L ----------

OBS	DATE	SPC_COND	TEMP	PH
195	11NOV81	3750	12.4	8.3

APPENDIX 5-2.9

Upper and Lower Aquifer Water Quality Data
MIS Monitoring Program

RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM
WATER CHEMISTRY DATA - TRACT C-A
UPPER AQUIFER QUALITY DATA - MIS MONITORING PROGRAM

---------- REPORT YEAR=1981 TYPE=UPPA STATION=CE-709U ----------

OBS	DATE	TEMP	PH	SPC_COND	WL	ALL	AS	BA	BE	B	BR	CD	CA	CL
6	30JAN81	10.1	7.4	1425	.	0.1	0.01	0.1	0.01	0.32	0.2	0.01	116	13.9
7	25FEB81	11.0	7.5	1550	.	.	.	.	.	0.38	.	.	120	11.7
8	31MAR81	10.9	7.0	1200	.	.	.	.	.	0.09	.	.	120	12.9
9	30APR81	11.8	7.0	1500	.	.	.	.	.	0.10	.	.	100	12.3
10	09DEC81	10.5	7.4	1750	.	.	.	.	.	0.21	1.6	.	120	14.4

OBS	CR	CU	F	FE	PB	LI	MG	MN	HG	NI	K	SE	AG	NA	SR
6	0.01	0.01	0.11	0.05	0.1	0.08	87	0.07	0.3	0.05	0.46	0.01	.	150	3.00
7	.	.	0.14	0.11	.	.	85	.	.	.	0.36	.	.	140	.
8	.	.	0.19	.	.	.	88	.	.	.	0.37	.	.	140	.
9	.	.	0.17	0.19	.	.	90	.	.	.	0.36	.	.	140	.
10	.	.	0.38	.	.	0.10	101	0.15	.	0.05	0.05	.	.	144	3.52

RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM
WATER CHEMISTRY DATA - TRACT C-A
UPPER AQUIFER QUALITY DATA - MIS MONITORING PROGRAM

---------- REPORT YEAR=1981 TYPE=UPPA STATION=CE-709U ----------

OBS	V	ZN	SBI	GA	GE	MOL	NI	TI	WR	HCO3	CO3	OH	SO4	SO3	S	TSS	TCN	TSO4
6	0.5	0.03	.	0.01	0.5	0.1	0.1	.	0.5	.	10	560	1	0.5	439	.	0.1	.	.	.
7	.	.	.	.	.	.	.	.	.	.	.	548	1	0.5	525	.	.	.	.	.
8	.	.	.	.	.	.	.	.	.	.	.	547	.	.	500	.	.	.	.	.
9	.	.	.	.	.	.	.	.	.	.	.	594	.	.	441	.	.	.	.	.
10	.	0.04	.	.	.	.	.	.	.	.	.	613	.	.	502	.	.	.	.	.

OBS	TDS	ALK	HARD	PO4	NH3	NO2	NO3	TOC	DOC	CN	PHE	OGD	BOD	COD	SIO2	KJEL	ORTHOP	ALPHA	BETA
6	1292	481	648	0.01	0.60	1.000	0.1	.	11	0.05	0.12	.	.	73	32	.	.	2	8.0
7	1216	469	650	0.02	0.10	4.000	0.1	.	4	.	.	.	.	.	35	.	.	.	.
8	1196	469	661	0.01	0.10	0.002	.	.	8	.	.	.	.	.	32	.	.	.	.
9	1132	507	620	.	0.19	0.003	.	.	5	.	.	.	.	.	36	.	.	.	.
10	1225	520	715	0.01	.	.	0.1	.	5	.	.	.	.	.	32	.	.	0	7.3

RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM
WATER CHEMISTRY DATA - TRACT C-A
UPPER AQUIFER QUALITY DATA - MIS MONITORING PROGRAM

---------- REPORT YEAR=1981 TYPE=UPPA STATION=GS-15U ----------

	DATE	TEMP	PH	SPC COND	WALL	AALS	BASE	BB	BBR	BCD	CCA	CCL	CRU	CU	F	FE	PB	LI
	29JAN81	13.1	7.4	2300	.	.	.	.	.	0.10	.	.	124	4.96	.	.	0.10	0.16	.	.
2	24FEB81	14.1	7.6	2400	.	.	.	.	.	0.50	.	.	140	9.47	.	.	0.13	0.10	.	.
3	26MAR81	.	8.8	1600	.	.	.	.	.	2.40	.	.	20	21.80	.	.	0.50	.	.	.
4	14APR81	14.1	8.1	2100	.	.	.	.	.	0.02	.	.	81	15.10	.	.	0.21	.	.	.
5	10NOV81	10.8	7.6	2400	.	.	.	.	.	.	.	.	110	11.10	.	.	0.92	.	.	0.26

	MG	MN	HGI	NIK	SEG	AGA	NAR	SRV	ZN	SBI	BAE	GGL	MONI	STW	ZR	HCO3	CO3	OH	SO4
1	159	.	.	0.65	.	.	260	.	.	.	.	.	.	.	.	619	.	.	923
2	142	.	.	0.60	.	.	250	.	.	.	.	.	.	.	.	622	1.00	0.5	976
3	58	.	.	1.04	.	.	320	.	.	.	.	.	.	.	.	427	5.41	.	548
4	130	.	.	0.72	.	.	280	.	.	.	.	.	.	.	.	574	.	.	835
5	170	0.4	.	0.64	.	.	250	3.63	0.03	.	.	.	.	.	.	635	.	.	974

	SO3	TSS	TSCN	TSO4	TDS	ALK	AHARD	POP04	NH3	NO2	NO3	TOC	DOC	PNEG	BOD	CCD	SIO2	KJEL	ORTHOP	ALPHA	BETA
1	.	.	.	.	2028	527	964	0.12	.	3	.	.	4	.	.	.	31	.	.	.	.
2	.	.	.	.	1928	533	934	0.01	0.10	2	0.1	.	3	.	.	.	34	.	.	.	.
3	.	.	.	.	1236	459	288	.	4.60	.	.	.	32	.	.	.	6	.	.	.	.
4	.	.	.	.	1590	489	737	0.01	0.07	.	.	.	2	.	.	.	19	.	.	.	.
5	.	.	.	.	1961	537	974	0.06	0.54	.	.	.	11	.	.	.	36	.	.	21	24

RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM
WATER CHEMISTRY DATA - TRACT C-A
UPPER AQUIFER QUALITY DATA - MIS MONITORING PROGRAM

---------- REPORT YEAR=1981 TYPE=LOWA STATION=GS-15L ----------

OBS	DATE	TEMP	PH	SPC $\bar{C}$ND	WL	AL	AS	BA	BE	B	BR	CD	CA	CL	CR	CU
1	29JAN81	16.3	7.9	4250	.	.	.	.	.	0.60	.	.	2.50	74.9	.	.
2	24FEB81	17.2	8.0	4000	.	.	.	.	.	3.30	.	.	3.00	76.0	.	.
3	31MAR81	10.9	9.0	3610	.	.	.	.	.	0.21	.	.	2.87	53.8	.	.
4	14APR81	17.5	8.5	2900	.	.	.	.	.	1.38	.	.	3.00	68.2	.	.
5	10NOV81	12.4	8.3	3750	.	.	.	.	.	.	.	.	3.20	63.5	.	.

OBS	F	FE	PB	LI	MG	MN	HG	NI	K	SE	AG	NA	SR	V	ZN	SB
1	20.6	.	.	.	26	.	.	.	2.30	.	.	1180	.	.	.	.
2	4.1	0.05	.	.	26	.	.	.	2.11	.	.	1110	.	.	.	.
3	22.8	.	.	.	36	.	.	.	2.09	.	.	960	.	.	.	.
4	10.0	.	.	.	36	.	.	.	2.07	.	.	880	.	.	.	.
5	62.9	.	.	0.39	26	0.01	.	.	1.77	.	.	860	0.09	.	0.03	.

RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM
WATER CHEMISTRY DATA - TRACT C-A
UPPER AQUIFER QUALITY DATA - MIS MONITORING PROGRAM

---------- REPORT YEAR=1981 TYPE=LOWA STATION=GS-15L ----------

BI	AG	EG	LO	NS	IT	WA	RZ	HCO3	CO3	OH	SO4	SO3	S	TSS	TSC	TSO4	TDS	ALK
.	.	.	.	.	.	.	.	2651	1.03	.	288	.	.	.	.	.	2832	2264
.	.	.	.	.	.	.	.	2517	2.37	0.5	269	.	.	.	.	.	2752	2171
.	.	.	.	.	.	.	.	2111	2.40	.	263	.	.	.	.	.	2240	1829
.	.	.	.	.	.	.	.	1901	4.57	.	293	.	0.4	.	.	.	2100	1728
.	.	.	.	.	.	.	.	2103	.	.	132	.	.	.	.	.	2347	1827

HARD	PO4	NH3	NO2	NO3	TCC	DOC	CN	PHE	OG	BOD	COD	SIO2	KJEL	ORTHOP	ALPHA	BETA
113	0.06	.	.	0.1	.	5	.	.	.	.	.	9	.	.	.	.
115	0.01	0.20	1.000	0.1	.	12	.	.	.	.	.	10	.	.	.	.
155	.	0.10	0.001	.	.	4	.	.	.	.	.	8	.	.	.	.
155	0.04	0.13	.	.	.	3	.	0.25	.	.	17	5	.	.	0	11
115	0.11	2.58	.	.	.	22	.	.	.	.	.	8	.	.	5	0

APPENDIX 5-2.10

Multivariate Analysis of Variance (MANOVA)
Variance Test Results for the
Upper Aquifer Water Quality
MIS Monitoring Program

RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM
MULTIVARIATE ANALYSIS OF VARIANCE - WATER CHEMISTRY DATA
MODIFIED INSITU DEVELOPMENT SYSTEM
TYPE=UPPA

GENERAL LINEAR MODELS PROCEDURE

MANOVA TEST CRITERIA FOR THE HYPOTHESIS OF NO OVERALL RPTYP EFFECT

H = TYPE I SS&CP MATRIX FOR: RPTYP
E = ERROR SS&CP MATRIX
P = DEP. VARIABLES = 11
Q = HYPOTHESIS DF = 5
NE= DF OF E = 139
S = MIN(P,Q) = 5
M = .5(ABS(P-Q)-1) = 2.5
N = .5(NE-P-1) = 63.5

HOTELLING-LAWLEY TRACE = TR(E**-1*H) = 8.78148446

F APPROXIMATION = 2(S*N+1)*TR(E**-1*H)/(S*S*(2M+S+1))
WITH S(2M+S+1) AND 2(S*N+1) DF

F(55,637) = 20.34 PROB > F = 0.0001

PILLAI'S TRACE V = TR(H*INV(H+E)) = 1.44405749

F APPROXIMATION = (2N+S+1)/(2M+S+1) * V/(S-V)
WITH S(2M+S+1) AND S(2N+S+1) DF

F(55,665) = 4.91 PROB > F = 0.0001

WILKS' CRITERION L = DET(E)/DET(H+E) = 0.05945096

W = -(NE-.5(P-Q+1))*LN(L) = 382.4628
U = NE-.5(P-Q+1) = 135.5000
Z = SQRT((P*P*Q*Q-4)/(P*P+Q*Q-5) = 4.6288
D = (P*Q-2)/4 = 13.2500

F APPROXIMATION = (U*Z-2D)/(P*Q)*(1-L**1/Z)/L**1/Z
WITH P*Q AND U*Z-2D DF

F(55,600) = 9.17 PROB > F = 0.0001

RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM
MULTIVARIATE ANALYSIS OF VARIANCE - WATER CHEMISTRY DATA
MODIFIED INSITU DEVELOPMENT SYSTEM
TYPE=UPPA

GENERAL LINEAR MODELS PROCEDURE

MANOVA TEST CRITERIA FOR THE HYPOTHESIS OF NO OVERALL ARTYS EFFECT

ROY'S MAXIMUM ROOT CRITERION = 0.09347567

FIRST CANONICAL VARIABLE YIELDS AN F UPPER BOUND

F(5,139) = 225.00 (UPPER BOUND)

RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM
MULTIVARIATE ANALYSIS OF VARIANCE - WATER CHEMISTRY DATA
MODIFIED INSITU DEVELOPMENT SYSTEM
TYPE=UPPA

GENERAL LINEAR MODELS PROCEDURE

MANOVA TEST CRITERIA FOR THE HYPOTHESIS OF NO OVERALL AREA EFFECT

H = TYPE I SS&CP MATRIX FOR: AREA
E = ERROR SS&CP MATRIX
P = DEP. VARIABLES = 11
Q = HYPOTHESIS DF = 2
NE= DF OF E = 139
S = MIN(P,Q) = 2
M = .5(ABS(P-Q)-1) = 4.0
N = .5(NE-P-1) = 63.5

HOTELLING-LAWLEY TRACE = TR(E**-1*H) = 4.44054353

F APPROXIMATION = 2(S*N+1)*TR(E**-1*H)/(S*S*(2M+S+1))
WITH S(2M+S+1) AND 2(S*N+1) DF

F(22,256) = 25.84 PROB > F = 0.0001

PILLAI'S TRACE V = TR(H*INV(H+E)) = 1.19091670

F APPROXIMATION = (2N+S+1)/(2M+S+1) * V/(S-V)
WITH S(2M+S+1) AND S(2N+S+1) DF

F(22,260) = 17.40 PROB > F = 0.0001

WILKS' CRITERION L = DET(E)/DET(H+E) = 0.12562345

EXACT F = (1-SQRT(L))/SQRT(L)*(NE+Q-P-1)/P
WITH 2P AND 2(NE+Q-P-1) DF

F(22,258) = 21.36 PROB > F = 0.0001

ROY'S MAXIMUM ROOT CRITERION = 3.77264142

FIRST CANONICAL VARIABLE YIELDS AN F UPPER BOUND

F(2,139) = 262.20 (UPPER BOUND)

APPENDIX 5-3

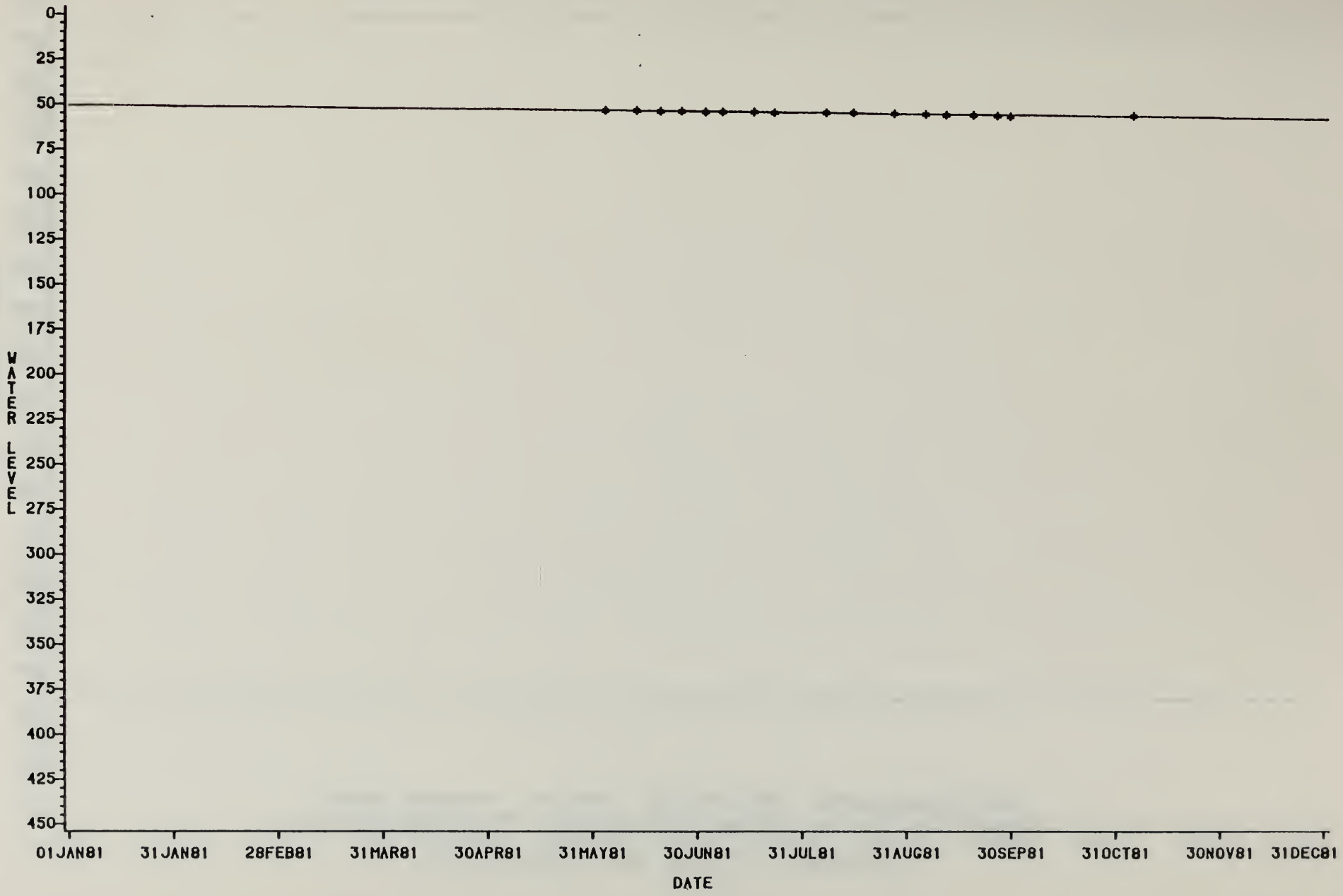
Hydrology Monitoring Data
Lurgi Plant Site Program

APPENDIX 5-3.1

Hydrology Field Data
Lurgi Plant Site Program

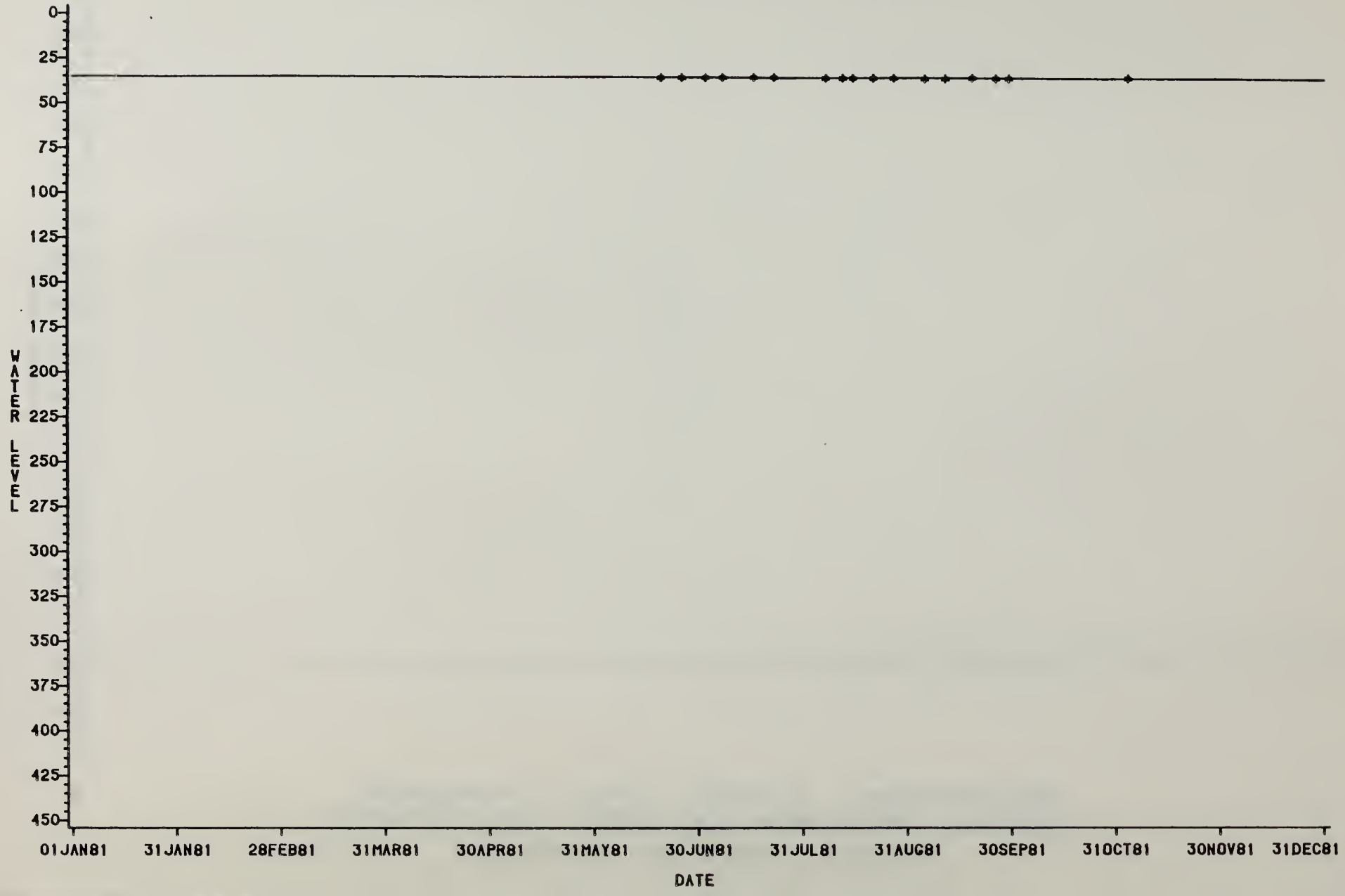
RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM

REPORT YEAR=1981 TYPE=ALUV STATION=GS-S22 PARAMETER=WATER LEVEL



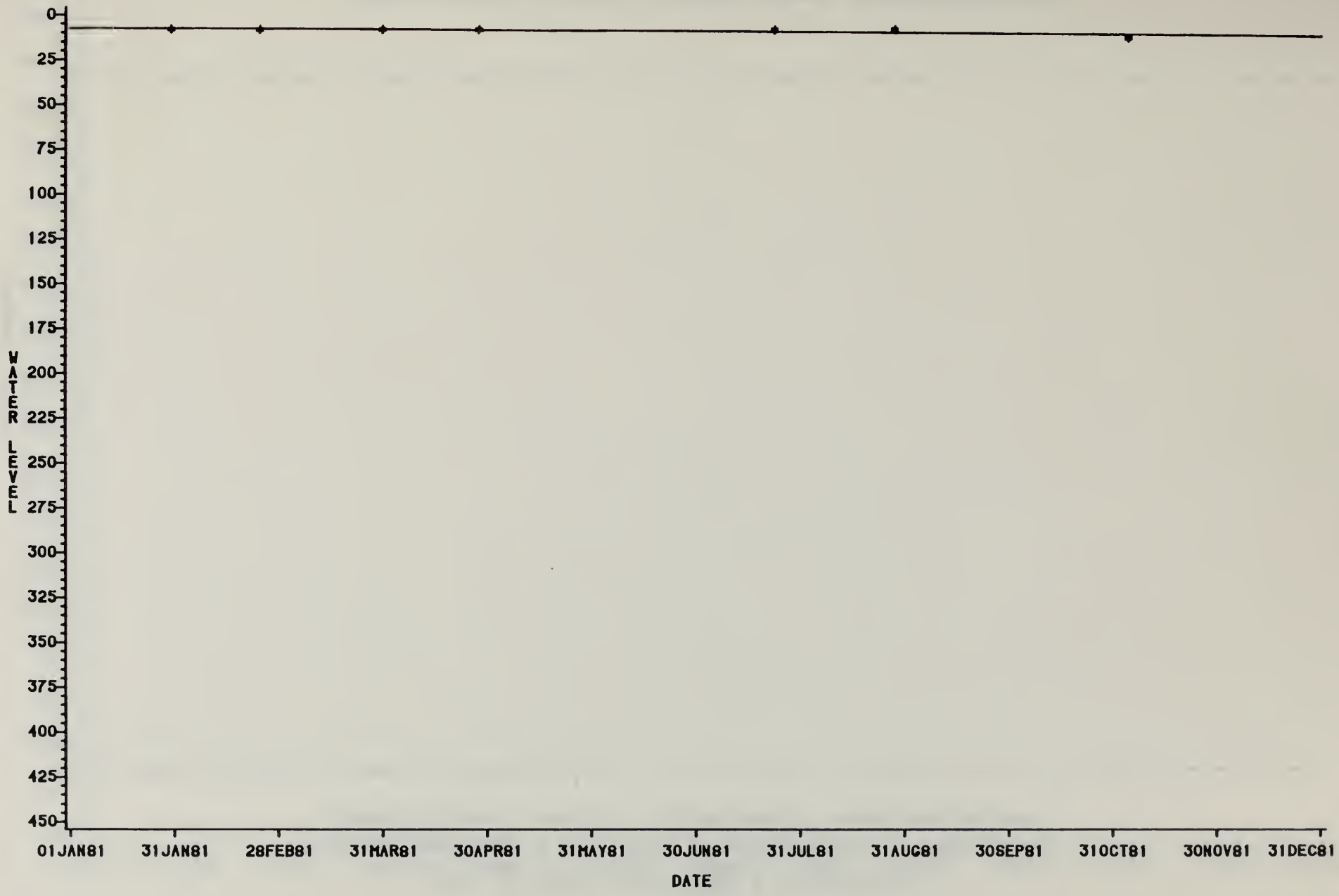
RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM

REPORT YEAR=1981 TYPE=ALUV STATION=GS-S23 PARAMETER=WATER LEVEL



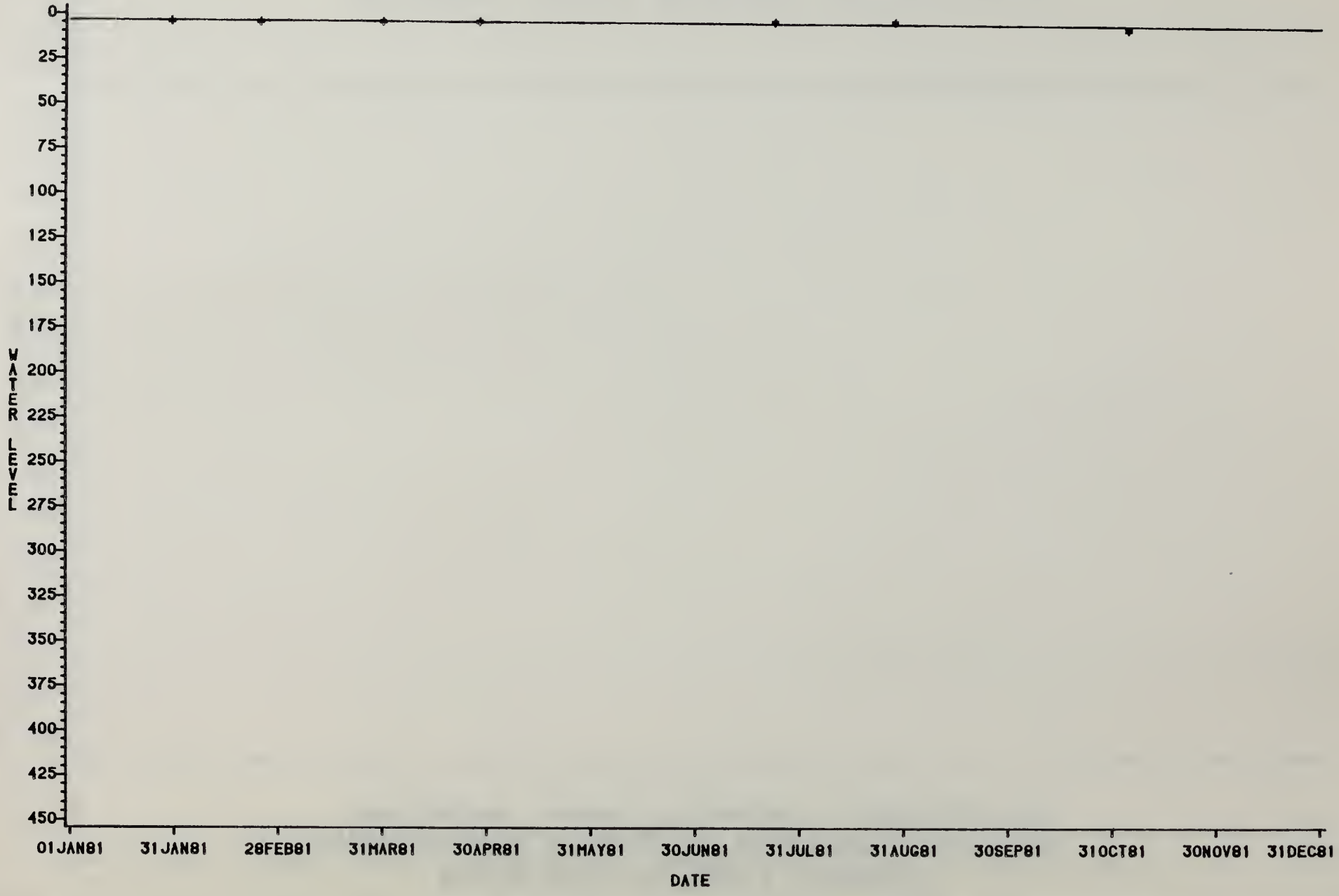
RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM

REPORT YEAR=1981 TYPE=ALUV STATION=GS-S28D PARAMETER=WATER LEVEL



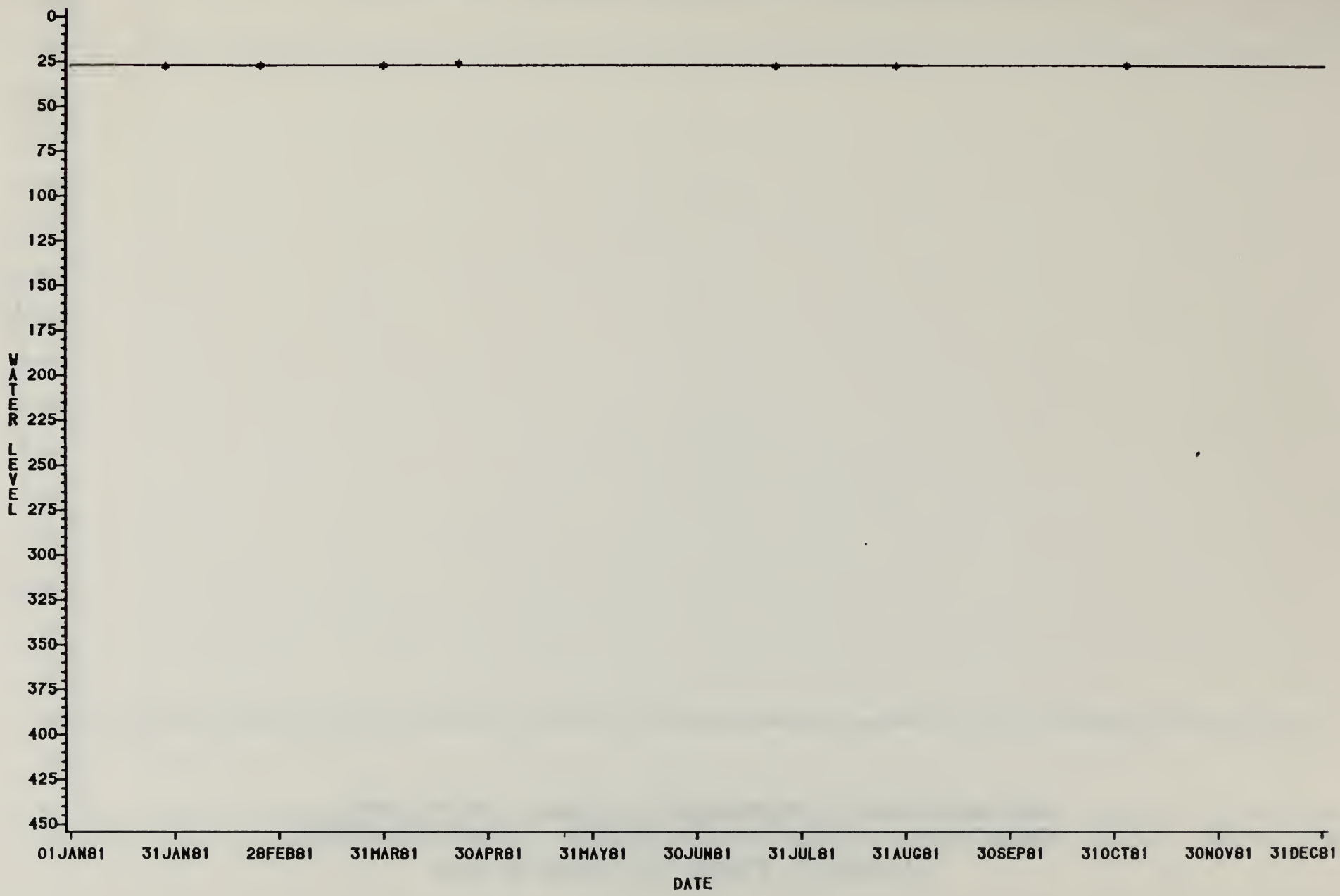
RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM

REPORT YEAR=1981 TYPE=ALUV STATION=GS-S28AS PARAMETER=WATER LEVEL



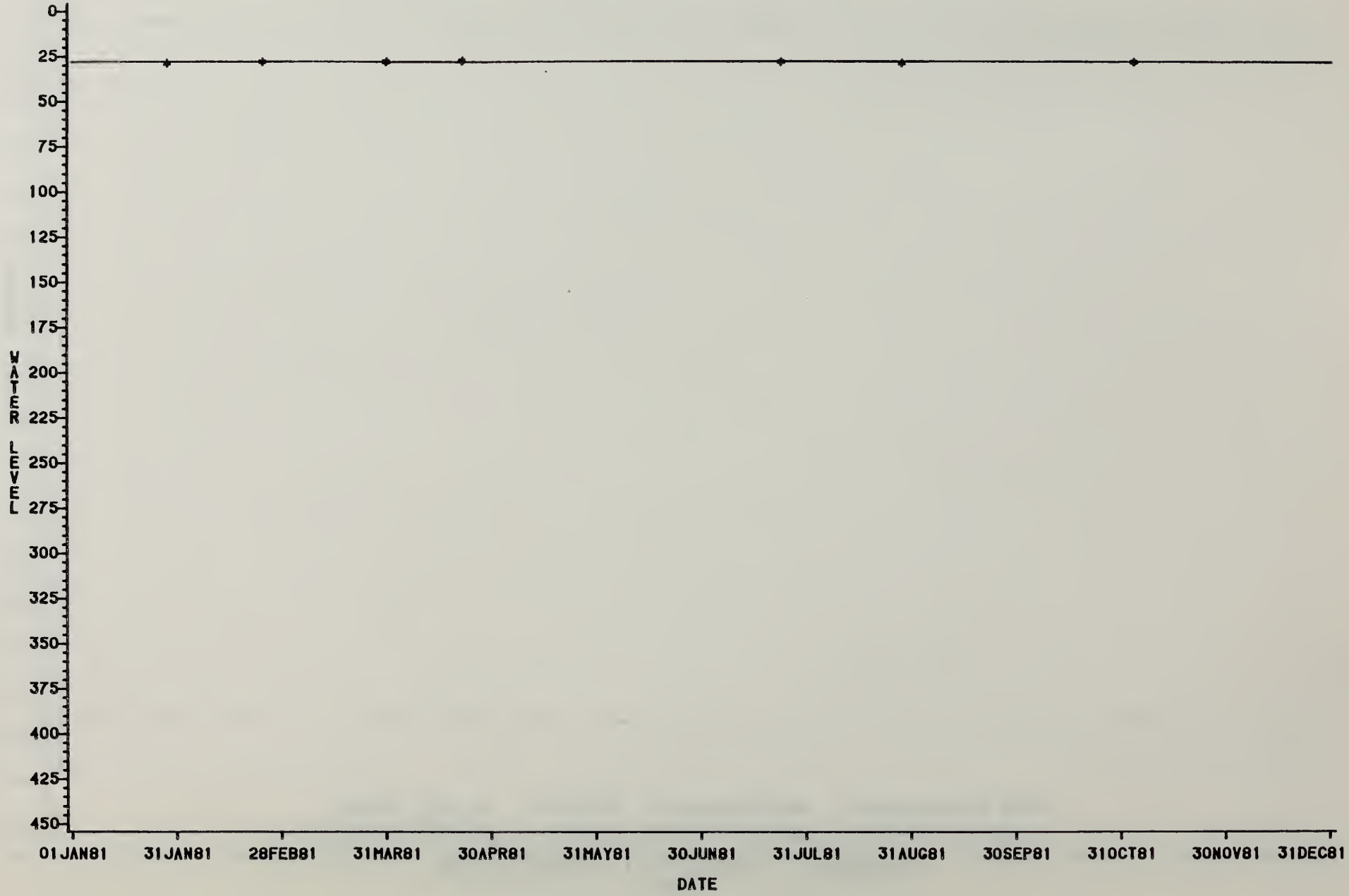
RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM

REPORT YEAR=1981 TYPE=ALUV STATION=CS-S29AD PARAMETER=WATER LEVEL



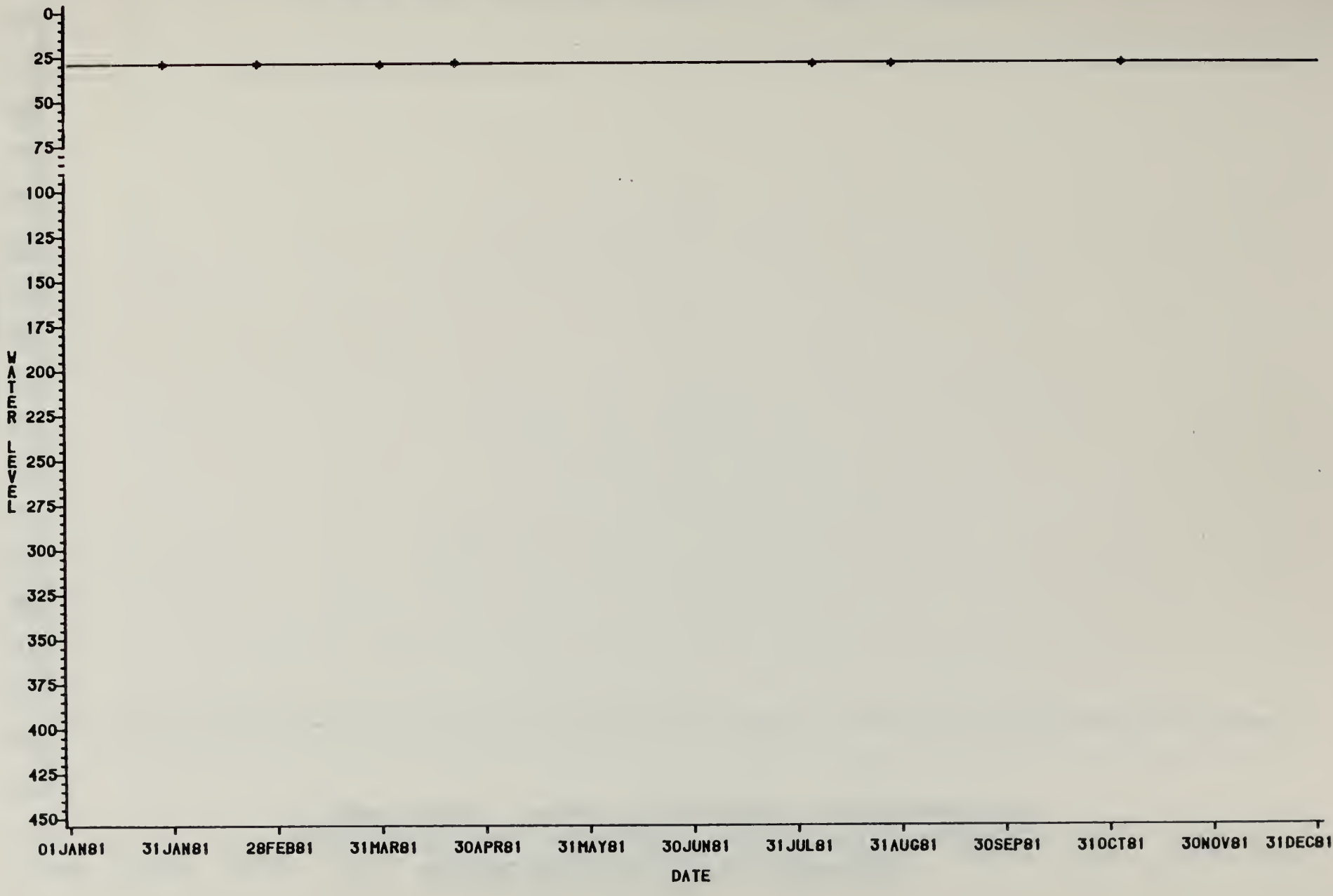
RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM

REPORT YEAR=1981 TYPE=ALUV STATION=CS-S29AS PARAMETER=WATER LEVEL



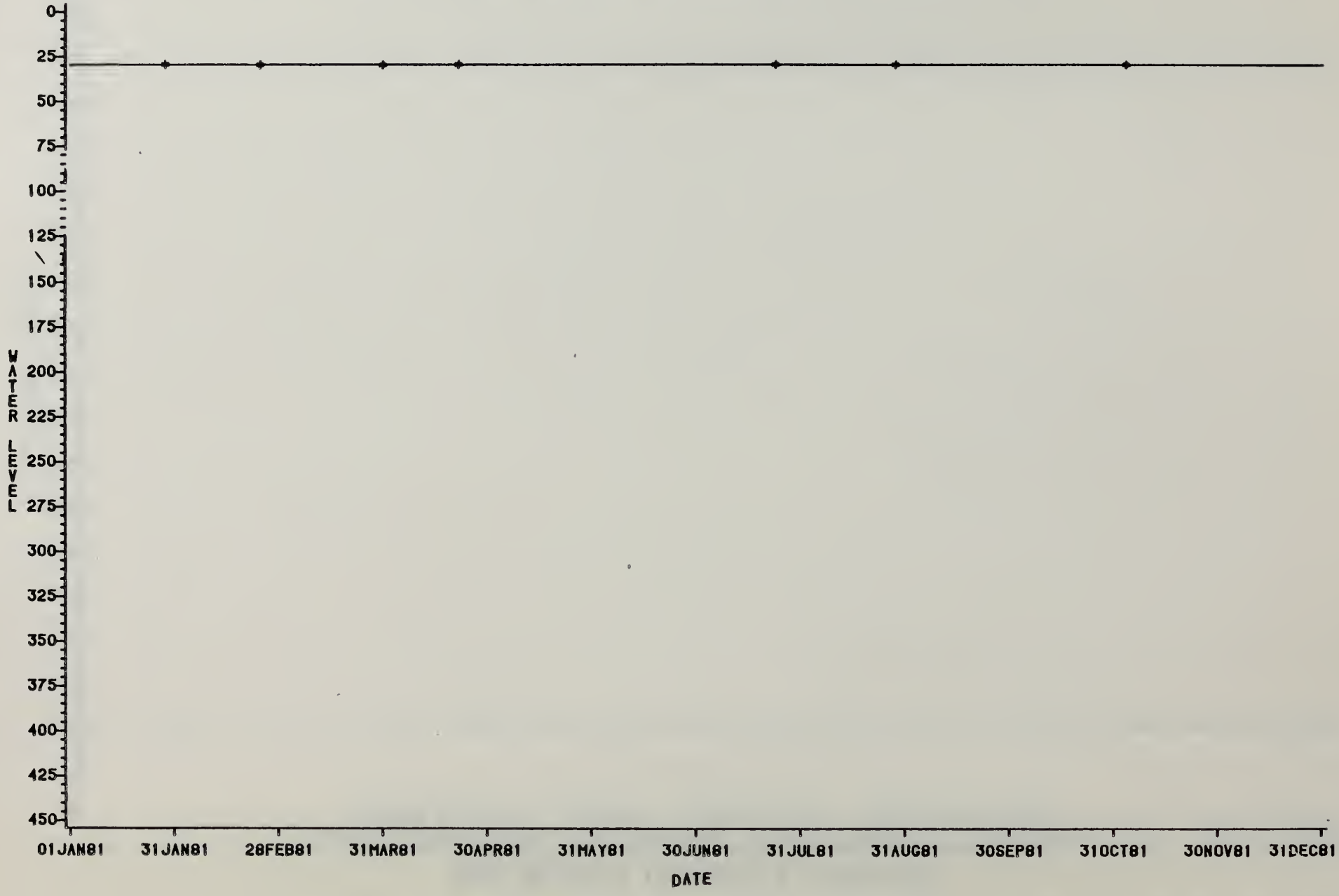
RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM

REPORT YEAR=1981 TYPE=ALUV STATION=GS-S29D PARAMETER=WATER LEVEL



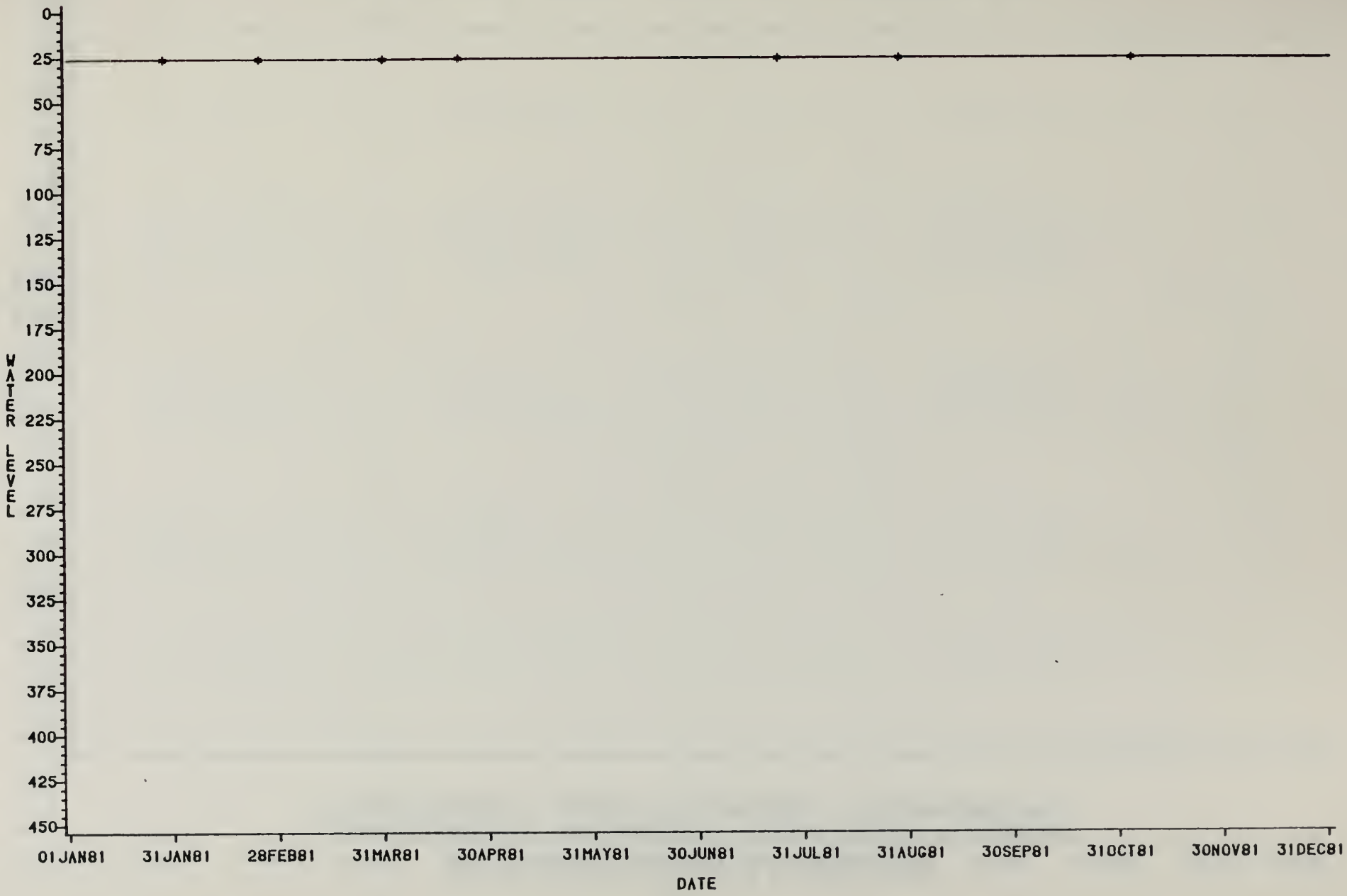
RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM

REPORT YEAR=1981 TYPE=ALUV STATION=GS-S29S PARAMETER=WATER LEVEL



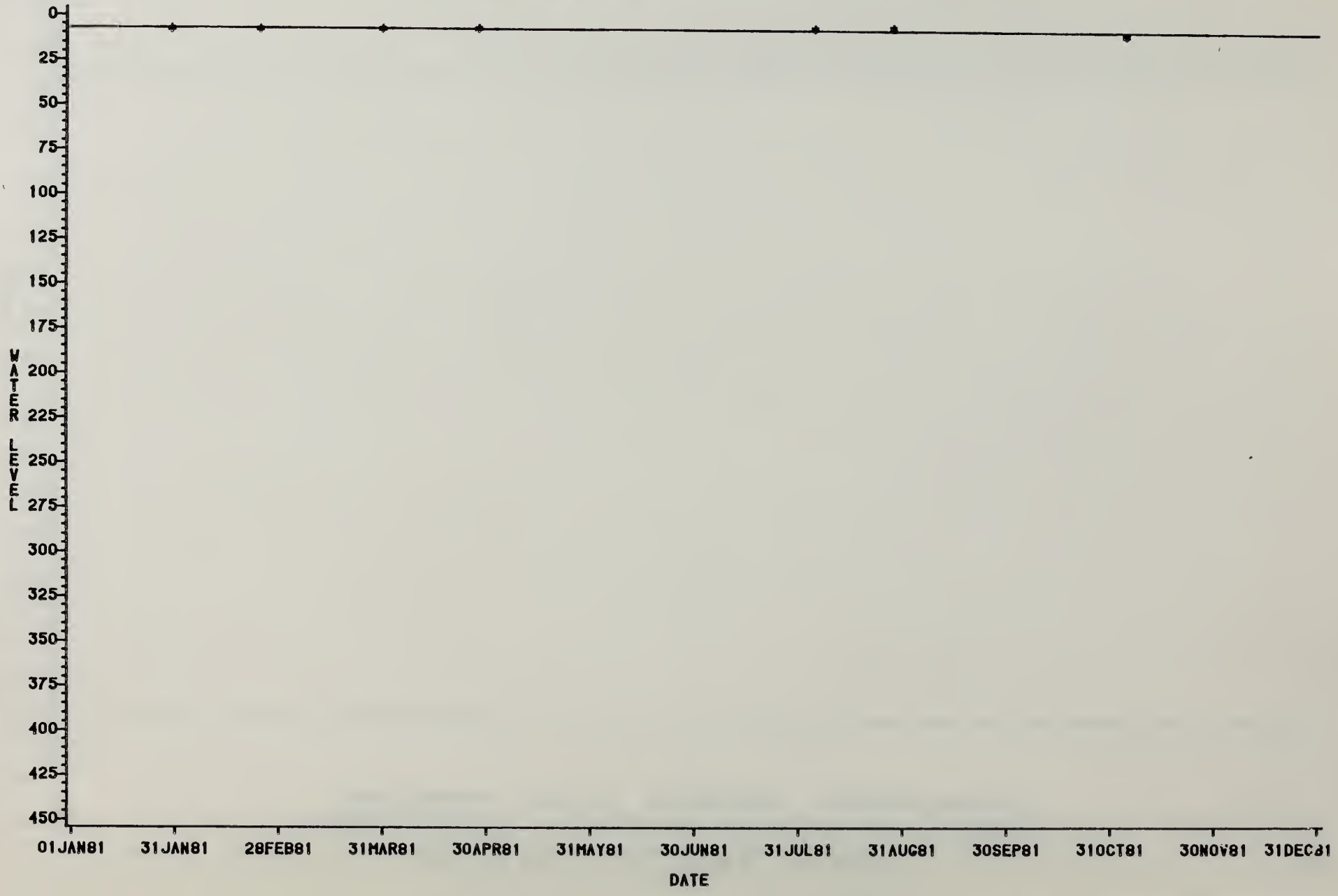
RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM

REPORT YEAR=1981 TYPE=ALUV STATION=CS-S30 PARAMETER=WATER LEVEL



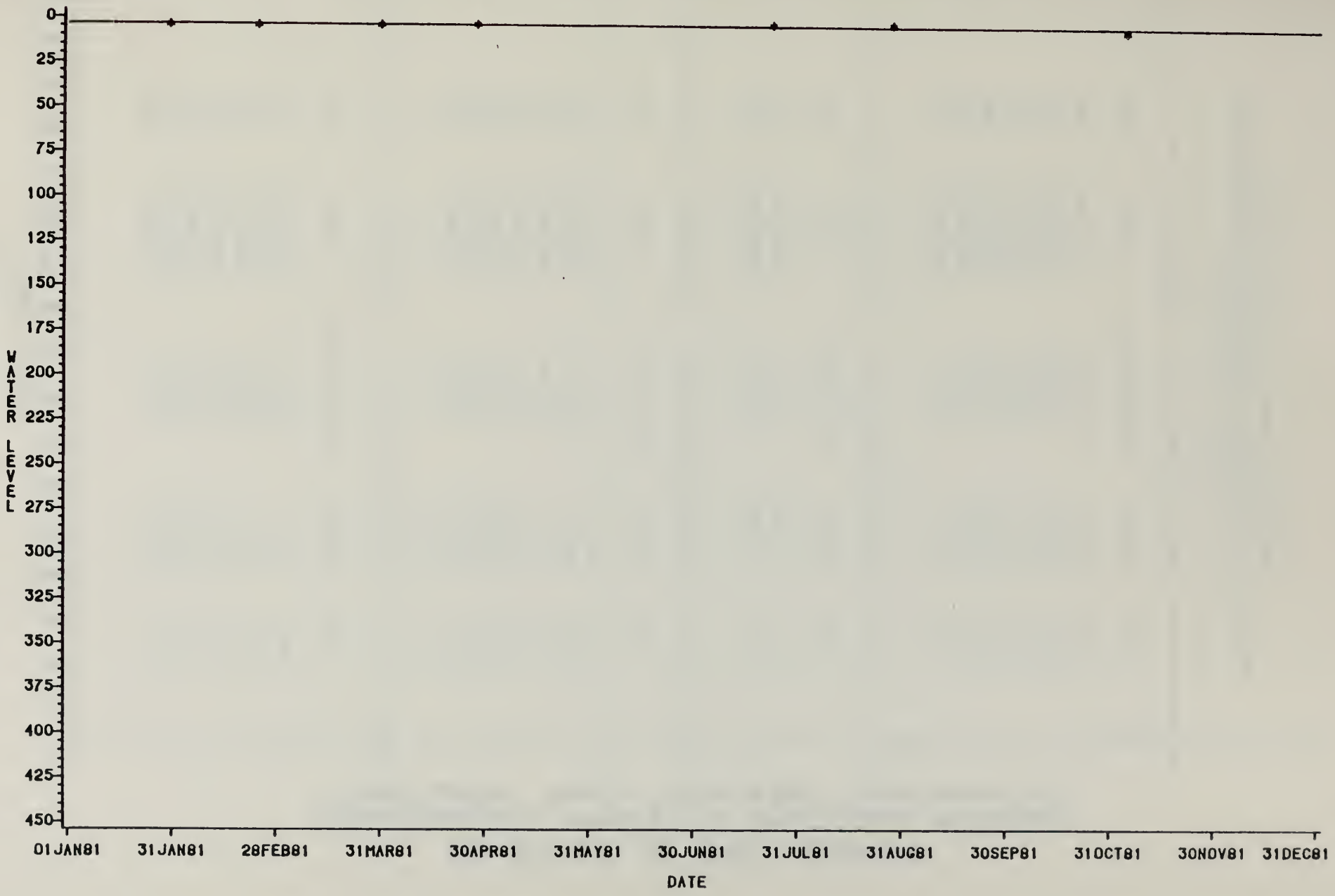
RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM

REPORT YEAR=1981 TYPE=ALUV STATION=GS-S28S PARAMETER=WATER LEVEL



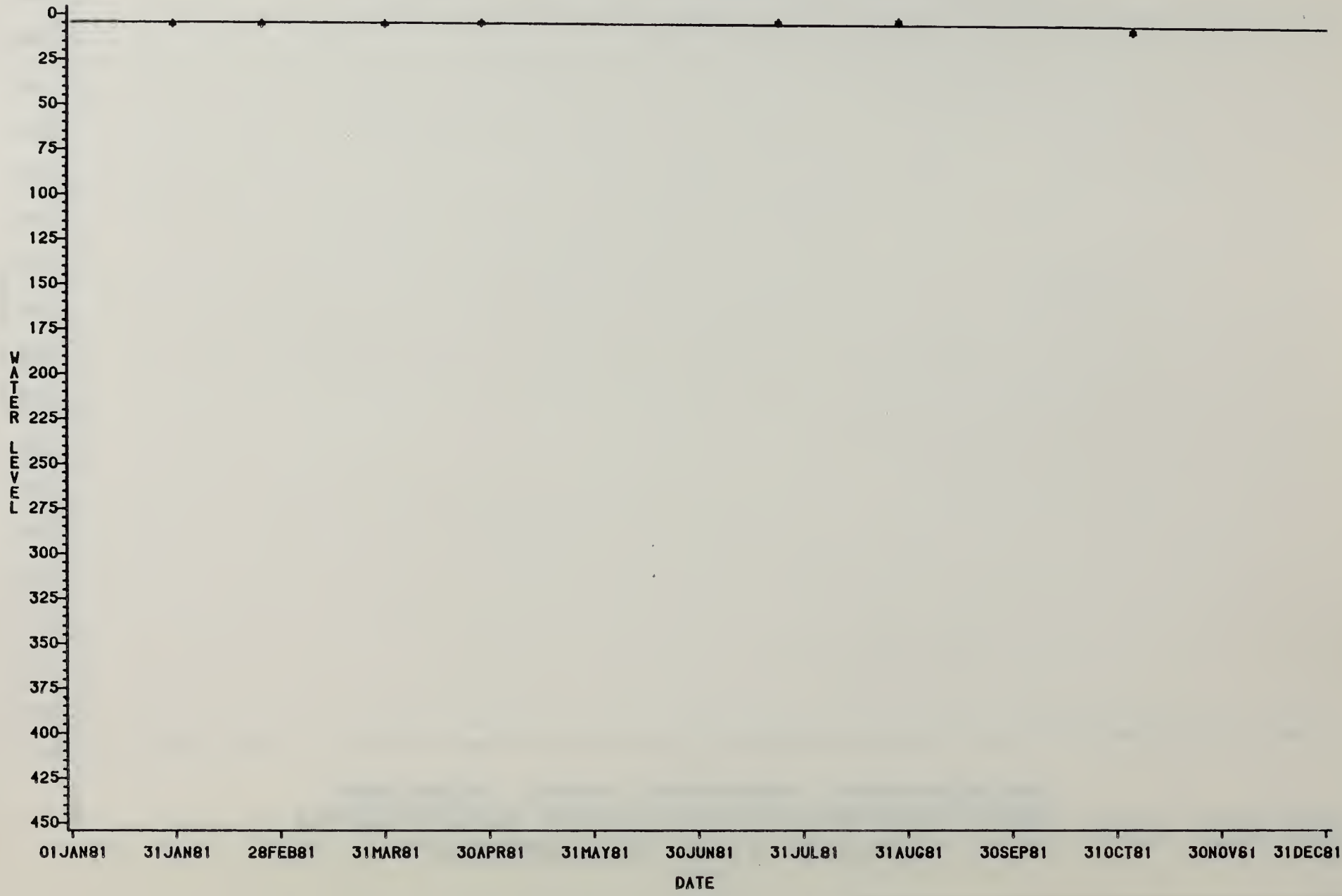
RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM

REPORT YEAR=1981 TYPE=ALUV STATION=GS-S28AS PARAMETER=WATER LEVEL



RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM

REPORT YEAR=1981 TYPE=ALUV STATION=CS-S28AD PARAMETER=WATER LEVEL



RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM
FIELD DATA - 1981

---------- TYPE=ALUV STATION=GS-S29AD ----------

OBS	DATE	SPC_COND	TEMP	PH
95	28JAN81	2200	8.2	7.5
96	24FEB81	2200	8.5	7.6
97	31MAR81	2200	8.6	7.6
98	22APR81	2325	9.6	7.3
99	23JUL81	2400	18.2	7.2
100	27AUG81	2450	16.1	7.3
101	03NOV81	2150	7.8	7.7

---------- TYPE=ALUV STATION=GS-S29AS ----------

OBS	DATE	SPC_COND	TEMP	PH
102	24FEB81	2925	9.2	7.2
103	31MAR81	2900	9.3	7.2

---------- TYPE=ALUV STATION=GS-S29D ----------

OBS	DATE	SPC_COND	TEMP	PH
104	28JAN81	3775	9.4	7.8
105	24FEB81	4150	8.5	7.6
106	31MAR81	4225	8.9	7.7
107	22APR81	4600	8.8	7.5
108	04AUG81	4800	15.0	7.3
109	27AUG81	4850	14.6	7.4
110	03NOV81	4200	7.2	7.6

---------- TYPE=ALUV STATION=GS-S30 ----------

OBS	DATE	SPC_COND	TEMP	PH
111	28JAN81	2175	9.0	7.6
112	24FEB81	2050	9.5	7.5
113	31MAR81	2100	9.6	7.6
114	22APR81	2200	9.2	7.7
115	23JUL81	2150	18.1	7.4
116	27AUG81	2100	16.6	7.5
117	03NOV81	2150	9.0	7.4

RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM
FIELD DATA - 1981

---------- TYPE=ALUV STATION=GS-S28AD ----------

OBS	DATE	SPC_COND	TEMP	PH
72	30JAN81	2650	6.0	7.6
73	24FEB81	2850	6.5	7.5
74	31MAR81	2775	6.9	7.9
75	23JUL81	2850	16.0	7.3
76	27AUG81	2850	16.0	7.3
77	04NOV81	2750	8.3	8.0

---------- TYPE=ALUV STATION=GS-S28AS ----------

OBS	DATE	SPC_COND	TEMP	PH
78	30JAN81	2775	6.5	7.4
79	24FEB81	2475	7.2	7.4
80	31MAR81	2500	7.0	7.5
81	23JUL81	2600	16.5	7.2
82	27AUG81	2650	16.0	7.3
83	04NOV81	2750	8.3	7.5

---------- TYPE=ALUV STATION=GS-S28D ----------

OBS	DATE	SPC_COND	TEMP	PH
84	30JAN81	1950	7.0	7.8
85	24FEB81	1900	7.0	7.7
86	31MAR81	1900	7.0	7.7
87	23JUL81	2000	17.3	7.4
88	27AUG81	2050	16.2	7.5
89	04NOV81	2000	9.2	7.8

---------- TYPE=ALUV STATION=GS-S28S ----------

OBS	DATE	SPC_COND	TEMP	PH
90	30JAN81	2990	7.5	7.4
91	24FEB81	2675	7.5	7.4
92	31MAR81	2900	7.9	7.6
93	04AUG81	3150	16.5	7.3
94	27AUG81	3300	16.0	7.4

RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM
FIELD DATA - 1981

---------- TYPE=ALUV STATION=GS-S22 ----------

OBS	DATE	SPC_COND	TEMP	PH
1	03JUN81	1450	9.9	8.0
2	12JUN81	1450	9.8	8.0
3	19JUN81	1400	9.9	8.1
4	25JUN81	1375	9.8	8.2
5	02JUL81	1400	11.0	8.2
6	07JUL81	1400	11.2	8.2
7	16JUL81	1400	11.0	8.2
8	22JUL81	1400	11.5	8.2
9	06AUG81	2350	9.6	7.5
10	14AUG81	2400	9.9	7.6
11	26AUG81	2300	9.7	7.6
12	04SEP81	1950	8.5	7.7
13	10SEP81	1950	8.8	7.7
14	18SEP81	2100	11.4	7.6
15	25SEP81	2100	8.5	8.2
16	04NOV81	2400	7.7	7.8

---------- TYPE=ALUV STATION=GS-S23 ----------

OBS	DATE	SPC_COND	TEMP	PH
17	19JUN81	1500	9.6	8.4
18	25JUN81	1500	9.6	8.4
19	02JUL81	1500	10.4	8.1
20	07JUL81	1500	10.6	8.0
21	16JUL81	1524	10.5	7.9
22	22JUL81	1500	10.5	8.0
23	06AUG81	1200	9.8	7.5
24	11AUG81	1200	11.0	8.0
25	14AUG81	1150	10.1	7.5
26	20AUG81	1150	10.0	7.5
27	26AUG81	1200	9.6	7.6
28	04SEP81	1700	8.9	7.6
29	10SEP81	1750	8.9	7.6
30	18SEP81	1700	11.4	7.5
31	25SEP81	1800	9.2	8.4
32	03NOV81	1800	8.2	7.8

RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM
FIELD DATA - 1981

---------- TYPE=UPPA STATION=GS-M1U ----------

OBS	DATE	SPC_COND	TEMP	PH
221	25JUN81	1150	15.7	7.6
222	27OCT81	1375	14.0	7.8

---------- TYPE=UPPA STATION=GS-M6U ----------

OBS	DATE	SPC_COND	TEMP	PH
230	22OCT81	1860	13.4	7.9

---------- TYPE=UPPA STATION=GS-M7U ----------

OBS	DATE	SPC_COND	TEMP	PH
231	25JUN81	1600	13.7	6.8
232	21OCT81	1825	12.5	7.0

---------- TYPE=UPPA STATION=GS-M8U ----------

OBS	DATE	SPC_COND	TEMP	PH
233	25JUN81	1350	12.6	8.7
234	27OCT81	1825	10.6	7.7

APPENDIX 5-3.2

Water Quality Data
Lurgi Plant Site Program

RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM
WATER CHEMISTRY DATA - TRACT C-A
WATER QUALITY DATA - LURGI SITE PROGRAM

---------- REPORT YEAR=1981 TYPE=ALUV STATION=GS-S22 ----------

OBS	DATE	TEMP	PH	SPC COND	WL	AA LS	AB SA	BB AE	B	BR	CD	CA	CL	CR	CU	F	FE	PB	LI
1	18AUG81	9.8	7.6	2350	.	.	.	.	0.15	.	.	75	30.0	.	0.04	0.48	.	.	0.03
2	04NOV81	7.7	7.8	2400	.	.	.	.	0.46	.	.	87	25.9	.	.	0.39	.	.	.

OBS	MG	MN	HG	NI	K	SE	AG	NA	SR	V	ZN	SB	BI	AG	EL	MO	NI	ST	W	ZR	HCO3	CO3	OH	SO4	SO3
1	180	.	3.9	.	1.68	.	.	310	3.14	.	0.03	.	.	.	.	.	.	.	.	.	718	.	.	986	.
2	170	.	1.2	.	1.95	.	.	270	.	.	.	.	.	.	.	.	.	.	.	.	726	.	.	860	.

OBS	SS	TSS	TSC	TSN	TDS	ALK	HARD	PO4	NH3	NO2	NO3	TOC	DOC	CNE	PHO	BOD	COD	SI02	K	TOR	ALP	BET
1	.	.	.	.	2150	609	928	0.07	0.34	.	0.8	.	4	.	.	.	.	26	.	.	21	21
2	.	169	.	.	1952	619	916	0.23	1.14	.	0.4	.	10	.	.	.	.	31	.	.	.	.

RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM
WATER CHEMISTRY DATA - TRACT C-A
WATER QUALITY DATA - LURGI SITE PROGRAM

---------- REPORT YEAR=1981 TYPE=ALUV STATION=GS-S28AD ----------

OBS	DATE	TEMP	PH	SPC COND	WL	AL	AS	BA	BE	B	BR	CD	CA	CL	CR
3	30JAN81	6.5	7.4	2775	.	.	.	.	.	0.35	.	.	151	31.9	.
4	31JAN81	6.0	7.6	2650	.	.	.	.	.	0.25	.	.	139	28.5	.
5	28APR81	8.2	7.2	2875	.	.	.	.	.	0.25	0.8	.	180	33.5	.
6	23JUL81	16.0	7.3	2850	.	.	.	.	.	0.24	.	.	240	32.6	.
7	04NOV81	8.3	8.0	2750	.	.	.	.	.	1.00	.	.	130	30.4	.

OBS	CU	F	FE	PB	LI	MG	MN	HG	NI	K	SE	AG	NA	SR	V
3	.	0.11	0.05	.	.	191	.	.	.	3.6	.	.	340	.	.
4	.	0.11	0.05	.	.	183	.	.	.	3.9	.	.	300	.	.
5	0.01	0.11	.	.	0.03	190	0.40	.	.	2.7	.	.	350	5.2	.
6	0.11	0.35	.	.	0.06	220	0.31	5.5	.	3.9	.	.	310	3.8	.
7	.	0.39	.	.	.	190	.	0.5	.	2.5	.	.	270	.	.

RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM
WATER CHEMISTRY DATA - TRACT C-A
WATER QUALITY DATA - LURGI SITE PROGRAM

---------- REPORT YEAR=1981 TYPE=ALUV STATION=GS-S28AD ----------

OBS	ZN	SB	BI	GA	GE	MOL	SN	TI	W	ZR	HCO3	CO3	OH	SO4	SO3	S	TSS	TCN	TSO4	TDS
3	.	.	.	.	.	.	.	.	.	.	730	1	0.5	1202	.	.	.	.	.	2388
4	.	.	.	.	.	.	.	.	.	.	756	1	0.5	1119	.	.	.	.	.	2356
5	0.04	.	.	.	.	.	.	.	.	.	747	.	.	1367	.	0.6	.	.	.	2608
6	0.03	.	.	.	.	.	.	.	.	.	747	.	.	1483	.	.	.	.	.	2664
7	.	.	.	.	.	.	.	.	.	.	698	.	.	1122	.	.	27	.	.	2198

OBS	ALK	HARD	PO4	NH3	NO2	NO3	TCC	DOC	CN	PHE	OGD	BOD	CCD	SI02	KJEL	ORTHOP	ALPHA	BETA
3	619	1163	0.04	1.10	2.000	0.6	.	17	.	.	.	.	.	24	.	.	.	.
4	641	1100	0.01	1.30	11.000	0.1	.	24	.	.	.	.	.	23	.	.	.	.
5	642	1231	0.07	0.09	0.009	0.5	.	7	.	.	.	.	19	23	.	.	0	0
6	632	1504	0.05	1.08	.	0.5	.	10	.	.	.	.	.	25	.	.	0	16
7	594	1106	0.24	3.58	.	0.3	.	15	.	.	.	.	.	23	.	.	.	.

RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM
WATER CHEMISTRY DATA - TRACT C-A
WATER QUALITY DATA - LURGI SITE PROGRAM

---------- REPORT YEAR=1981 TYPE=ALUV STATION=GS-S28AS ----------

OBS	DATE	TEMP	PH	SPC COND	WL	AL	AS	BA	BE	B	BR	CD	CA	CL	CR
8	28APR81	8.3	7.4	2310	.	.	0.01	.	.	0.66	0.2	.	130	33.5	.
9	29APR81	8.4	7.4	2800	.	.	.	.	.	0.25	0.7	.	160	25.7	.
10	23JUL81	16.5	7.2	2600	.	.	.	.	.	0.22	.	.	200	31.0	.
11	04NOV81	8.3	7.5	2750	.	.	.	.	.	0.66	.	.	140	33.3	.

OBS	CU	F	FE	PB	LI	MG	MN	HG	NI	K	SE	AG	NA	SR	V
8	.	0.12	.	.	0.04	210	0.64	.	.	1.42	.	.	240	3.48	.
9	0.03	0.13	.	.	0.03	150	0.04	.	.	2.70	.	.	360	4.46	.
10	0.04	0.37	.	.	0.05	168	0.10	0.8	.	4.30	.	.	390	3.21	.
11	.	0.39	.	.	.	200	.	0.6	.	4.80	.	.	280	.	.

RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM
WATER CHEMISTRY DATA - TRACT C-A
WATER QUALITY DATA - LURGI SITE PROGRAM

---------- REPORT YEAR=1981 TYPE=ALUV STATION=GS-S28AS ----------

ZN	SB	BI	AG	GE	MOL	STN	TI	WZ	RR	HCO3	CO3	OH	SO4	SO3	S	TSS	TSC	TSO4	TDS	AL K
0.02	.	.	.	.	.	.	.	.	.	741	.	.	1099	.	0.6	.	.	.	2264	637
0.02	.	.	.	.	.	.	.	.	.	729	.	.	1053	.	0.4	.	.	.	1932	617
0.05	.	.	.	.	.	.	.	.	.	708	.	.	1273	.	.	.	.	.	2456	602
.	.	.	.	.	.	.	.	.	.	744	.	.	1151	.	.	83	.	.	2309	629

HARD	PO4	NH3	NO2	NO3	TOC	DOC	CN	PHE	OG	BOD	COD	SIO2	KJEL	ORTHOP	ALPHA	BETA
1188	0.01	0.05	0.012	0.2	.	7	.	.	.	.	17	28	.	.	0	0
1016	0.10	0.05	0.001	0.1	.	9	.	0.04	.	.	19	24	.	.	0	3
1190	0.07	0.80	.	0.3	.	8	.	.	.	.	.	21	.	.	5	8
1172	2.57	13.40	.	.	.	33	.	.	.	.	.	22	.	.	.	.

RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM
WATER CHEMISTRY DATA - TRACT C-A
WATER QUALITY DATA - LURGI SITE PROGRAM

---------- REPORT YEAR=1981 TYPE=ALUV STATION=GS-S28D ----------

OBS	DATE	TEMP	PH	SPC COND	WL	AL	AS	BA	BE	B	BR	CD	CA	CL	CR
12	28APR81	8.0	7.7	2000	.	.	0.01	.	.	0.24	.	.	110	18.4	.
13	23JUL81	17.3	7.4	2000	.	.	.	.	.	0.21	.	.	140	23.0	.
14	04NOV81	9.2	7.8	2000	.	.	.	.	.	2.30	.	.	84	18.6	.

OBS	CU	F	FE	PB	LI	MG	MN	HG	NI	K	SE	AG	NA	SR	V
12	0.02	0.12	0.06	.	0.03	140	0.62	.	.	5.9	.	.	265	2.92	.
13	.	0.41	.	.	0.03	135	0.76	3.8	.	3.9	.	.	222	1.48	.
14	.	0.47	.	.	.	130	.	0.6	.	2.5	.	.	210	.	.

RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM
WATER CHEMISTRY DATA - TRACT C-A
WATER QUALITY DATA - LURGI SITE PROGRAM

---------- REPORT YEAR=1981 TYPE=ALUV STATION=GS-S28D ----------

	Z N	S B	B I	G A	G E	M O L	S N	T I	W	Z R	H C O 3	C O 3	O H	S O 4	S O 3	S	T S S	T C N	T S O 4	T D S	A L K
2	0.58	.	.	.	.	.	.	.	.	.	723	.	.	759	.	.	.	.	.	1508	617
3	0.09	.	.	.	.	.	.	.	.	.	689	.	.	744	.	.	.	.	.	1668	582
4	.	.	.	.	.	.	.	.	.	.	689	.	.	649	.	.	12	.	.	1510	579

	H A R D	P O 4	N H 3	N O 2	N O 3	T O C	D O C	C N	P H E	O G	B O D	C O D	S I O 2	K J E L	O R T H O P	A L P H A	B E T A
2	850	0.17	0.54	0.024	0.5	.	8	.	.	.	.	25	29	.	.	4	0
3	905	0.17	1.34	.	0.2	.	5	.	.	.	.	.	24	.	.	17	16
4	744	1.32	6.14	.	3.4	.	7	.	.	.	.	.	22	.	.	.	.

RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM
WATER CHEMISTRY DATA - TRACT C-A
WATER QUALITY DATA - LURGI SITE PROGRAM

---------- REPORT YEAR=1981 TYPE=ALUV STATION=GS-S28S ----------

OBS	DATE	TEMP	PH	SPC COND	WL	ALS	ABE	B	BRD	CDA	CL	CRU	F	FE	PB
15	30JAN81	7.5	7.4	2990	.	.	.	0.24	.	148	28.5	.	0.10	0.05	.
16	31JAN81	7.0	7.8	1950	.	.	.	0.31	.	91	18.4	.	0.11	0.05	.

OBS	LIG	MGI	MNG	HNI	NK	SEG	AGA	NAR	SVN	ZNB	SBI	BIA	GAE	GLN	MOS	STI	WR	ZR	HCO3	CO3	OH	SO4	SO3
15	.	194	.	.	2.3	.	.	410	.	.	.	.	.	.	.	.	.	.	876	1	0.5	1315	.
16	.	118	.	.	3.6	.	.	250	.	.	.	.	.	.	.	.	.	.	730	1	0.5	625	.

OBS	TSS	TCN	TS04	TDS	ALK	HARD	P04	NH3	NO2	NO3	TCC	DCC	CN	PHE	OGD	BCD	CCD	SI02	KJEL	ORTHP	ALPHA	BETA
15	.	.	.	2568	751	1168	0.09	0.9	7	0.1	.	16	.	.	.	.	.	23	.	.	.	.
16	.	.	.	1468	619	713	0.01	6.4	4	0.1	.	16	.	.	.	.	.	23	.	.	.	.

RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM
WATER CHEMISTRY DATA - TRACT C-A
WATER QUALITY DATA - LURGI SITE PROGRAM

---------- REPORT YEAR=1981 TYPE=ALUV STATION=GS-S29AD ----------

S	DATE	TEMP	PH	SPC_COND	WL	AL	AS	BA	BE	B	BR	CD	CA	CL	CR	CU
	28JAN81	8.2	7.5	2200	.	.	.	.	.	0.01	.	.	38	21.3	.	.
	22APR81	9.6	7.3	2325	.	.	.	.	.	0.01	.	.	76	19.9	.	.
	23JUL81	18.2	7.2	2400	.	.	.	.	.	0.25	.	.	140	22.5	.	.
	03NOV81	7.8	7.7	2150	.	.	.	.	.	0.71	.	.	74	20.3	.	.

S	F	FE	PB	LI	MG	MN	HG	NI	K	SE	AG	NA	SR	V	ZN	SB	BI	GA	GE
	0.11	0.18	.	.	170	.	.	.	2.5	.	.	310	.	.	.	.	.	.	.
	0.21	.	.	0.06	210	0.12	.	.	2.4	.	.	280	3.11	.	0.03	.	.	.	.
	0.36	.	.	0.05	172	.	.	.	3.2	.	.	320	2.49	.	.	.	.	.	.
	0.46	.	.	.	160	.	.	.	2.1	.	.	250	.	.	.	.	.	.	.

S	MOL	SN	TI	W	ZR	HCO3	CO3	OH	SO4	SO3	S	TSS	TCN	TSO4	TDS	ALK	HARD	PO4
	.	.	.	.	.	820	.	.	830	.	.	.	.	.	1816	704	919	0.05
	.	.	.	.	.	833	.	.	856	.	3.8	.	.	.	1708	722	1054	0.03
	.	.	.	.	.	827	.	.	985	.	.	.	.	.	2016	699	1057	.
	.	.	.	.	.	744	.	.	742	.	.	32	.	.	1693	634	843	0.08

S	NH3	NO2	NO3	TOC	DOC	CN	PHE	OG	BOD	COD	SIO2	KJEL	ORTHOP	ALPHA	BETA
	0.60	.	.	.	6	.	.	.	.	.	19	.	.	.	.
	0.09	0.007	0.0	.	7	.	0.02	.	.	13	27	.	.	16	12
	0.63	.	0.5	.	6	.	.	.	.	.	24	.	.	145	272
	0.78	.	.	.	4	.	.	.	.	.	22	.	.	.	.

RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM
WATER CHEMISTRY DATA - TRACT C-A
WATER QUALITY DATA - LURGI SITE PROGRAM

---------- REPORT YEAR=1981 TYPE=ALUV STATION=GS-S29D ----------

OBS	DATE	TEMP	PH	SPC COND	WL	AL	AS	BA	BE	B	BR	CD	CA	CL	CR	CU
21	28JAN81	9.4	7.8	3775	.	.	.	.	.	0.14	.	.	94	30.3	.	.
22	22APR81	8.8	7.5	4600	.	.	.	.	.	0.18	.	.	120	47.6	.	.
23	03NOV81	7.2	7.6	4200	.	.	.	.	.	0.71	.	.	110	50.7	.	.

OBS	F	FE	PB	LI	MG	MN	HG	NI	K	SE	AG	NA	SR	V	ZN	SB	BI	GA
21	0.16	.	.	.	280	.	.	.	3.1	.	.	690	.	.	.	.	.	.
22	0.21	.	.	0.05	360	0.27	0	.	3.0	.	.	870	5.1	.	0.01	.	.	.
23	0.63	.	.	.	270	.	.	.	2.6	.	.	710	.	.	.	.	.	.

RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM
WATER CHEMISTRY DATA - TRACT C-A
WATER QUALITY DATA - LURGI SITE PROGRAM

---------- REPORT YEAR=1981 TYPE=ALUV STATION=GS-S29D ----------

GE	MOL	SN	TI	W	ZR	HCO3	CO3	OH	SO4	SO3	S	TSS	TCN	TSO4	TDS	ALK	HARD
.	.	.	.	.	.	1110	.	.	1831	.	.	.	.	.	3440	942	1387
.	.	.	.	.	.	1152	.	.	2404	.	3.4	.	.	.	4224	983	1781
.	0.3	.	.	.	.	1147	.	.	2018	.	.	18	.	.	3942	969	1385

PO4	NH3	NO2	NO3	TOC	DOC	CN	PHE	OG	BOD	COD	SIO2	KJEL	ORTHOP	ALPHA	BETA
0.06	1.20	.	0.1	.	15	.	.	.	.	.	23	.	.	.	.
0.13	0.12	0.152	0.2	.	36	.	0.02	.	.	43	26	.	.	0	219
0.14	15.60	.	.	.	61	.	.	.	.	.	24	.	.	.	.

RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM
WATER CHEMISTRY DATA - TRACT C-A
WATER QUALITY DATA - LURGI SITE PROGRAM

---------- REPORT YEAR=1981 TYPE=ALUV STATION=GS-S30D ----------

OBS	DATE	TEMP	PH	SPC COND	WALL	ALSA	BE	B	BRD	CA	CL	CRU	F	FE	PB	LI
24	28JAN81	9.0	7.6	2175	.	.	.	0.12	.	78	142.0	.	0.11	.	.	.
25	23APR81	9.2	7.7	2200	.	.	.	0.02	.	68	21.8	.	0.15	0.09	.	0.06

OBS	MG	MN	HG	NI	K	SE	AG	NA	SR	V	ZN	SB	BI	AE	MOL	STN	IW	ZR	HCO3	CO3	OH	SO4	SO3
24	150	.	.	.	3.4	.	.	290	.	.	.	.	.	.	.	.	.	.	742	.	.	692	.
25	180	0.36	0	.	4.1	.	.	290	2.74	.	0.02	.	.	.	.	.	.	.	772	.	.	922	.

OBS	S	TSS	TSCN	TSO4	TDS	ALK	HARD	P04	NH3	NO2	NO3	TCC	DCN	PHE	G	OGD	BOD	CCD	SI02	KJEL	ORTHOP	ALPHA	BETA
24	.	.	.	.	1720	635	812	0.08	0.70	4.000	0.9	.	6	.	.	.	.	.	18	.	.	.	.
25	0.6	.	.	.	1824	662	910	0.02	0.11	0.281	0.8	.	4	.	0.02	.	.	16	20	.	.	6	0

RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM
WATER CHEMISTRY DATA - TRACT C-A
WATER QUALITY DATA - LURGI SITE PROGRAM

---------- REPORT YEAR=1981 TYPE=UPPA STATION=GS-M1U ----------

BS	DATE	TEMP	PH	SPC_COND	WL	AL	AS	BA	BE	B	BR	CD	CA	CL	CR	CU
5	29JAN81	13.6	7.5	1400	.	.	.	.	.	0.13	.	.	48	6.09	.	.
7	25FEB81	13.8	8.0	1190	.	.	.	.	.	0.23	.	.	37	11.20	.	.
8	30MAR81	13.0	7.6	1200	.	.	.	.	.	0.32	.	.	38	15.10	.	.
9	13APR81	14.8	7.7	1125	.	.	.	.	.	.	.	.	37	10.60	.	.
0	21JUL81	15.4	7.7	1350	.	.	0.01	.	.	0.20	.	.	38	9.70	.	.
1	27OCT81	14.0	7.8	1375	.	.	.	.	.	0.07	.	0.01	43	10.50	.	.

BS	F	FE	PB	LI	MG	MN	HG	NI	K	SE	AG	NA	SR	V	ZN	SB	BI	GA	GE
5	0.10	.	.	.	40	.	.	.	0.65	.	.	260	.	.	.	.	.	.	.
7	0.19	0.05	.	.	34	.	.	.	0.70	.	.	220	.	.	.	.	.	.	.
8	0.09	.	.	.	34	.	.	.	0.69	.	.	200	.	.	.	.	.	.	.
9	0.05	.	.	.	32	.	.	.	0.64	.	.	210	.	.	.	.	.	.	.
1	0.08	.	.	.	33	.	.	.	0.65	.	.	214	.	.	.	.	.	.	.
	0.24	.	.	.	39	0.03	.	0.13	0.70	.	.	230	2.4	.	0.01	.	.	.	.

BS	MOL	SN	TI	W	ZR	HCO3	CO3	OH	SO4	SO3	S	TSS	TCN	TSO4	TDS	ALK	HARD	PO4
5	.	.	.	.	.	482	.	.	411	.	.	.	.	.	920	417	284	0.03
7	.	.	.	.	.	411	1	0.5	352	.	.	.	.	.	852	355	232	0.01
8	.	.	.	.	.	388	.	.	340	.	.	.	.	.	836	339	234	.
9	.	.	.	.	.	372	.	.	342	.	.	.	.	.	828	324	224	0.01
	0.5	.	.	.	.	419	.	.	346	.	.	70	.	.	853	361	230	.
	0.4	.	.	.	.	452	.	.	360	.	.	.	.	.	953	384	267	0.07

S	NH3	NO2	NO3	TOC	DOC	CN	PHE	OG	BOD	COD	SIO2	KJEL	ORTHOP	ALPHA	BETA
	.	1.000	.	.	4	.	.	.	.	.	21	.	.	.	.
	0.10	4.000	0.1	.	5	.	.	.	.	.	18	.	.	.	.
	0.56	0.006	.	.	3	.	.	.	.	.	.	.	.	.	.
	0.04	.	.	.	10	.	.	.	.	.	19	.	.	.	.
	0.06	.	0.2	.	.	.	.	.	.	.	12	.	.	.	.
	.	.	.	.	5	.	.	.	.	.	23	.	.	1	4

RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM
WATER CHEMISTRY DATA - TRACT C-A
WATER QUALITY DATA - LURGI SITE PROGRAM

---------- REPORT YEAR=1981 TYPE=UPPA STATION=GS-M6U ----------

OBS	DATE	TEMP	PH	SPC_COND	WL	AL	AS	BA	BE	B	BR	CD	CA	CL	CR	CU
32	28JAN81	12.2	7.8	1475	.	0.3	.	.	.	0.01	0.8	.	57	9.47	.	.
33	21JUL81	13.9	7.9	1600	.	.	.	.	.	0.17	.	.	49	8.17	.	.
34	22OCT81	.	.	-200	.	.	.	.	.	0.69	.	.	41	9.92	.	0.03

OBS	F	FE	PB	LI	MG	MN	HG	NI	K	SE	AG	NA	SR	V	ZN	SB	BI	GA	GE
32	0.05	.	.	0.06	71	0.02	.	.	0.72	.	.	260	1.80	.	0.02	.	.	.	.
33	0.05	.	.	.	71	.	.	.	0.75	.	.	270	.	.	.	.	.	.	.
34	0.18	.	.	0.06	71	.	1.4	.	0.74	.	.	250	1.47	.	0.04	.	.	.	.

OBS	MOL	SN	TI	W	ZR	HCO3	CO3	OH	SO4	SO3	S	TSS	TCN	TSO4	TDS	ALK	HARD	PO4
32	.	.	.	.	.	833	1.27	.	372	.	.	.	.	.	1080	725	435	0.02
33	.	.	.	.	.	809	.	.	315	.	.	33	.	.	1084	681	414	0.02
34	.	.	.	.	.	830	.	.	280	.	.	.	.	.	1057	700	394	0.07

OBS	NH3	NO2	NO3	TOC	DOC	CN	PHE	OG	BOD	COD	SIO2	KJEL	ORTHOP	ALPHA	BETA
32	0.80	5	.	.	2	.	.	.	.	115	30	.	.	2	7
33	0.06	.	0.3	.	.	.	.	.	.	.	18	.	.	.	.
34	0.06	.	0.3	.	3	.	.	.	.	.	34	.	.	2	2

RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM
WATER CHEMISTRY DATA - TRACT C-A
WATER QUALITY DATA - LURGI SITE PROGRAM

---------- REPORT YEAR=1981 TYPE=UPPA STATION=GS-M7U ----------

	DATE	TEMP	PH	SPC COND	WL	AL	AS	BA	BE	B	BR	CD	CA
5	28JAN81	2.0	7.1	1650	.	0.1	0.02	.	.	0.12	0.8	.	134
6	21JUL81	12.8	7.5	1725	.	.	.	.	.	0.18	.	.	130
7	22OCT81	.	.	-200	.	.	.	.	.	0.29	.	.	130

	CL	CR	CU	F	FE	PB	LI	MG	MN	HG	NI	K	SE	AG	NA
5	6.09	.	.	0.06	0.19	.	0.10	93	0.04	.	.	0.52	.	.	180
6	9.70	.	.	0.11	.	.	.	91	.	.	.	0.57	.	.	170
7	11.10	.	0.02	0.27	.	.	0.09	95	0.02	3.1	.	0.49	.	.	170

RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM
WATER CHEMISTRY DATA - TRACT C-A
WATER QUALITY DATA - LURGI SITE PROGRAM

---------- REPORT YEAR=1981 TYPE=UPPA STATION=GS-M7U ----------

OBS	SR	V	ZN	SB	BI	GA	GE	MOL	SN	TI	W	ZR	HCO3	CO3	OH	SO4	SO3	S	TSS	TCN	TSO4
35	3.07	.	0.02	.	.	.	.	.	.	.	.	.	626	.	.	647	.	0.2	.	.	.
36	.	.	.	.	.	.	.	.	.	.	.	.	610	.	.	549	.	.	26	.	.
37	2.76	.	0.04	.	.	.	.	.	.	.	.	.	616	.	.	562	.	.	.	.	.

OBS	TDS	AL K	HARD	P04	NH3	NO2	NO3	TOC	DOC	CN	PHE	OG	BD	CD	SI02	KJEL	ORTHOP	ALH A	BETA
35	1372	532	717	0.04	1.20	.	.	.	9	.	.	.	.	137	38	.	.	4	5
36	1378	520	699	0.01	0.06	.	.	.	3	.	.	.	.	.	23	.	.	.	.
37	1311	524	715	0.07	.	.	0.2	.	4	.	.	.	.	.	40	.	.	0	1

RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM
WATER CHEMISTRY DATA - TRACT C-A
WATER QUALITY DATA - LURGI SITE PROGRAM

---------- REPORT YEAR=1981 TYPE=UPPA STATION=GS-M8U ----------

OBS	DATE	TEMP	PH	SPC COND	WL	AL	AS	BA	BE	B	BR	CD	CA	CL
38	30JAN81	9.8	7.6	1450	.	0.1	0.01	0.1	0.01	0.21	0.2	0.01	34	5.97
39	21JUL81	11.7	8.3	1600	.	.	.	.	.	0.24	.	.	30	4.59
40	27OCT81	10.6	7.7	1825	.	.	.	.	.	0.14	.	0.03	46	8.23

OBS	CR	CU	F	FE	PB	LI	MG	MN	HG	NI	K	SE	AG	NA	SR
38	0.01	0.01	0.14	0.05	0.1	0.23	76	0.04	0.3	0.05	0.58	0.01	.	220	8.1
39	.	.	0.26	.	.	.	96	.	.	.	0.71	.	.	220	.
40	.	.	0.38	.	.	0.24	120	0.08	.	.	0.91	.	.	220	14.1

RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM
WATER CHEMISTRY DATA - TRACT C-A
WATER QUALITY DATA - LURGI SITE PROGRAM

---------- REPORT YEAR=1981 TYPE=UPPA STATION=GS-M8U ----------

OBS	V	ZN	SB	BI	GA	GE	MOL	SNI	STI	WR	HCO3	CO3	OH	SO4	SO3	S	TSS	TCN
38	0.5	0.01	.	0.01	0.5	0.1	0.1	.	0.5	. 10	579	1.03	0.5	384	.	0.1	.	.
39	.	.	.	.	.	.	.	.	.	. .	617	.	.	440	.	.	32	.
40	.	0.01	.	.	.	.	.	.	.	. .	732	.	.	453	.	.	.	.

OBS	TSO4	TDS	ALK	HARD	PO4	NH3	NO2	NO3	TOC	DOC	CN	PHE	OG	BOD	COD	SIO2	K	CRTHOP	ALPHA	BETA
38	.	1032	515	398	0.01	0.60	1	0.1	.	7	0.05	0.1	.	.	68	19	.	.	5	12
39	.	1147	529	470	.	0.12	.	.	.	.	.	.	.	.	.	7	.	.	.	.
40	.	1352	619	608	0.07	.	.	.	.	8	.	.	.	.	.	24	.	.	4	1

APPENDIX 5-3.3

Multivariate Analysis of Variance (MANOVA) Variance Tests for the Alluvial and Upper Aquifer Lurgi Plant Site Monitoring Program

RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM
MULTIVARIATE ANALYSIS OF VARIANCE - WATER CHEMISTRY DATA
LOWER TECHNOLOGY DEVELOPMENT AREA
TYPE=ALUV

GENERAL LINEAR MODELS PROCEDURE

MANOVA TEST CRITERIA FOR THE HYPOTHESIS OF NO OVERALL RPTYP EFFECT

H = TYPE I SS&CP MATRIX FOR: RPTYR
E = ERROR SS&CP MATRIX
P = DEP. VARIABLES = 11
G = HYPOTHESIS DF = 5
NE= DF OF E = 54
S = MIN(P,G) = 5
M = .5(ABS(P-G)-1) = 2.5
N = .5(NE-P-1) = 21.0

HOTELLING-LAWLEY TRACE = TR(E**-1*H) = 5.78485899

F APPROXIMATION = 2(S*N+1)*TR(E**-1*H)/(S*S*(2M+S+1))
WITH S(2M+S+1) AND 2(S*N+1) DF

F(55,212) = 4.46 PROB > F = 0.0001

PILLAI'S TRACE V = TR(H*INV(H+E)) = 2.02703564

F APPROXIMATION = (2N+S+1)/(2M+S+1) * V/(S-V)
WITH S(2M+S+1) AND S(2N+S+1) DF

F(55,240) = 2.98 PROB > F = 0.0001

WILKS' CRITERION L = DET(E)/DET(H+E) = 0.04291379

W = -(NE-.5(P-G+1))*LN(L) = 159.0024
U = NE-.5(P-G+1) = 50.5000
Z = SQRT((P*P*G*G-4)/(P*P+G*G-5) = 4.6288
B = (P*G-2)/4 = 13.2500

F APPROXIMATION = (U*Z-2B)/(P*G)*(1-L**1/Z)/L**1/Z
WITH P*G AND U*Z-2B DF

F(55,207) = 3.67 PROB > F = 0.0001

RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM
MULTIVARIATE ANALYSIS OF VARIANCE - WATER CHEMISTRY DATA
LURGI TECHNOLOGY DEVELOPMENT AREA
TYPE=ALUV

GENERAL LINEAR MODELS PROCEDURE

MANOVA TEST CRITERIA FOR THE HYPOTHESIS OF NO OVERALL RPTYR EFFECT

ROY'S MAXIMUM ROOT CRITERION = 0.54923025

FIRST CANONICAL VARIABLE YIELDS AN F UPPER BOUND

F(5,54) = 38.33 (UPPER BOUND)

RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRA'
MULTIVARIATE ANALYSIS OF VARIANCE - WATER CHEMISTRY DATA
LURGI TECHNOLOGY DEVELOPMENT AREA
TYPE=ALUV

GENERAL LINEAR MODELS PROCEDURE

MANOVA TEST CRITERIA FOR THE HYPOTHESIS OF NO OVERALL AREA EFFECT

H = TYPE I SS&CP MATRIX FOR: AREA
E = ERROR SS&CP MATRIX
P = DEP. VARIABLES = 11
Q = HYPOTHESIS DF = 2
NE= DF OF E = 54
S = MIN(P,Q) = 2
M = .5(ABS(P-Q)-1) = 4.0
N = .5(NE-P-1) = 21.0

HOTELLING-LAWLEY TRACE = TR(E**-1*H) = 7.92294373

F APPROXIMATION = 2(S*N+1)*TR(E**-1*H)/(S*S*(2M+S+1))
WITH S(2M+S+1) AND 2(S*N+1) DF

F(22,86) = 15.49 PROB > F = 0.0001

PILLAI'S TRACE V = TR(H*INV(H+E)) = 1.24070092

F APPROXIMATION = (2N+S+1)/(2M+S+1) * V/(S-V)
WITH S(2M+S+1) AND S(2N+S+1) DF

F(22,90) = 6.68 PROB > F = 0.0001

WILKS' CRITERION L = DET(E)/DET(H+E) = 0.07651954

EXACT F = (1-SQRT(L))/SQRT(L)*(NE+Q-P-1)/R
WITH 2R AND 2(NE+Q-P-1) DF

F(22,88) = 10.46 PROB > F = 0.0001

ROY'S MAXIMUM ROOT CRITERION = 7.35965455

FIRST CANONICAL VARIABLE YIELDS AN F UPPER BOUND

F(2,54) = 198.71 (UPPER BOUND)

RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM
MULTIVARIATE ANALYSIS OF VARIANCE - WATER CHEMISTRY DATA
LURGI TECHNOLOGY DEVELOPMENT AREA
TYPE=UPPA

GENERAL LINEAR MODELS PROCEDURE

MANOVA TEST CRITERIA FOR THE HYPOTHESIS OF NO OVERALL AREA EFFECT

H = TYPE I SS&CP MATRIX FOR: AREA
E = ERROR SS&CP MATRIX
P = DEP. VARIABLES = 11
Q = HYPOTHESIS DF = 2
NE= DF OF E = 63
S = MIN(P,Q) = 2
M = .5(ABS(P-Q)-1) = 4.0
N = .5(NE-P-1) = 25.5

HOTELLING-LAWLEY TRACE = TR(E**-1*H) = 12.84652001

F APPROXIMATION = 2(S*N+1)*TR(E**-1*H)/(S*S*(2M+S+1))
WITH S(2M+S+1) AND 2(S*N+1) DF

F(22,104) = 30.36 PROB > F = 0.0001

PILLAI'S TRACE V = TR(H*INV(H+E)) = 1.52634624

F APPROXIMATION = (2N+S+1)/(2M+S+1) * V/(S-V)
WITH S(2M+S+1) AND S(2N+S+1) DF

F(22,108) = 15.82 PROB > F = 0.0001

WILKS' CRITERION L = DET(E)/DET(H+E) = 0.03190335

EXACT F = (1-SQRT(L))/SQRT(L)*(NE+Q-P-1)/P
WITH 2P AND 2(NE+Q-P-1) DF

F(22,106) = 22.16 PROB > F = 0.0001

ROY'S MAXIMUM ROOT CRITERION = 11.29769545

FIRST CANONICAL VARIABLE YIELDS AN F UPPER BOUND

F(2,63) = 355.88 (UPPER BOUND)

RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM
MULTIVARIATE ANALYSIS OF VARIANCE - WATER CHEMISTRY DATA
LURGI TECHNOLOGY DEVELOPMENT AREA
TYPE=UPPA

GENERAL LINEAR MODELS PROCEDURE

MANOVA TEST CRITERIA FOR THE HYPOTHESIS OF NO OVERALL RPTYP EFFECT

H = TYPE I SS&CP MATRIX FOR: RPTYR
E = ERROR SS&CP MATRIX
P = DEP. VARIABLES = 11
Q = HYPOTHESIS DF = 6
NE= DF OF E = 63
S = MIN(P,Q) = 6
M = .5(ABS(P-Q)-1) = 2.0
N = .5(NE-P-1) = 25.5

HOTELLING-LAWLEY TRACE = TR(E**-1*H) = 25.85536937

F APPROXIMATION = 2(S*N+1)*TR(E**-1*H)/(S*S*(2M+S+1))
WITH S(2M+S+1) AND 2(S*N+1) DF

F(66,308) = 20.11 PROB > F = 0.0001

PILLAI'S TRACE V = TR(H*INV(H+E)) = 2.07328143

F APPROXIMATION = (2N+S+1)/(2M+S+1) * V/(S-V)
WITH S(2M+S+1) AND S(2N+S+1) DF

F(66,348) = 2.78 PROB > F = 0.0001

WILKS' CRITERION L = DET(E)/DET(H+E) = 0.01022791

W = -(NE-.5(P-Q+1))*LN(L) = 274.9581
U = NE-.5(P-Q+1) = 60.0000
Z = SQRT((P*P*Q*Q-4)/(P*P+Q*Q-5) = 5.3508
B = (P*Q-2)/4 = 16.0000

F APPROXIMATION = (U*Z-2B)/(P*Q)*(1-L**1/Z)/L**1/Z
WITH P*Q AND U*Z-2B DF

F(66,285) = 5.93 PROB > F = 0.0001

RIO BLANCO OIL SHALE COMPANY
ENVIRONMENTAL HYDROLOGY MONITORING PROGRAM
MULTIVARIATE ANALYSIS OF VARIANCE - WATER CHEMISTRY DATA
LURCI TECHNOLOGY DEVELOPMENT AREA
TYPE=UPPA

GENERAL LINEAR MODELS PROCEDURE

MANOVA TEST CRITERIA FOR THE HYPOTHESIS OF NO OVERALL PRTYR EFFECT

ROY'S MAXIMUM ROOT CRITERION = 24.15388443

FIRST CANONICAL VARIABLE YIELDS AN F UPPER BOUND

F(6,63) = 253.62 (UPPER BOUND)

Form 1279–3
(June 1984)

BORROWER'S C

TN 859 .C64 R56
Dec.81
Modular develop
monitoring rep

DATE LOANED	BORROWER

USDI – BLM